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***A CONDENSED REPORT ON FOREST PRODUCTS, PRICES,
SPECIFICATIONS, EQUIPMENT, UTILIZATION NEWS, ETC.***

Monitoring Forests Through Remote Sensing

Historically the Tennessee Division of Forestry (TDOF) has monitored the health and sustainability of the State's forests through the Forest Inventory and Analysis Program supported by the United States Department of Agriculture, Forest Service (USFS). Under this program, foresters measure all the trees on small areas across the State on a five year cycle, with one fifth of about 5,000 plots measured each year. The information is a sample and for the State as a whole provides accurate information on changes in forest area, volume, growth, and health. However, since each plot which is less than .2 acres in size represents over 5,000 acres at the State level, estimates of growth and inventory are often not reliable at the county level.

Remote sensing is the science of obtaining information about features on the Earth based on aerial and satellite sensors such as radar, LIDAR (Light Detection and Ranging), and multispectral cameras. Aerial and satellite photos are full of information but trying to analyze 13 million acres of forestland to find forest disturbances manually would be too costly. Computerized image analysis technology has advanced in the last few years and there are several programs that can extract features such as logging sites from aerial imagery. TDOF is using one of these programs to locate areas that have been harvested to give a more accurate estimate of forest harvesting. The program extracts forest canopy in one year and then in a separate operation, finds clearings/disturbances in a later aerial

photo. We were able to use photos available through the National Agricultural Imagery Program (NAIP) which takes aerial photos of the entire state every two years. When these two layers are overlaid and clipped (clipping subtracts the shapes in one layer from those in another), clearings in what was once forest canopy are found. This process has been automated since there are 3,000 separate images for the entire State. After the cleared sites are located they are sorted by size. Larger cleared areas are checked by viewing the site for changes in the forest. Both the before (2012) and after (2014) harvest areas are analyzed by a GIS technician to determine whether the cause of the harvesting can be determined. It is usually obvious from analysis of the site on the image whether the forest has been cleared due to forestry related activities or for urban land clearing, agriculture or some other cause. Major disturbances are due to forestry, agriculture, right of ways, residential land clearing, industrial-commercial building, highway construction, fires, insects and diseases and creation of lakes and ponds.

An example of the process is given below (Figure 1). In the first photo, forest canopy has been found and is designated by the areas shaded in green.



Figure 1. Forest Canopy 2012

The second photo of the same area is from 2014 and shows all the clearing/bare ground areas outlined in brown. Some of the harvested area has greened up but the skid trails and log landings still show up without vegetation in 2014.



Figure 2. Clearings 2014

The third step is to clip the two layers so that only the cleared areas from 2014 that are inside the 2012 canopy remain (Figure 3).

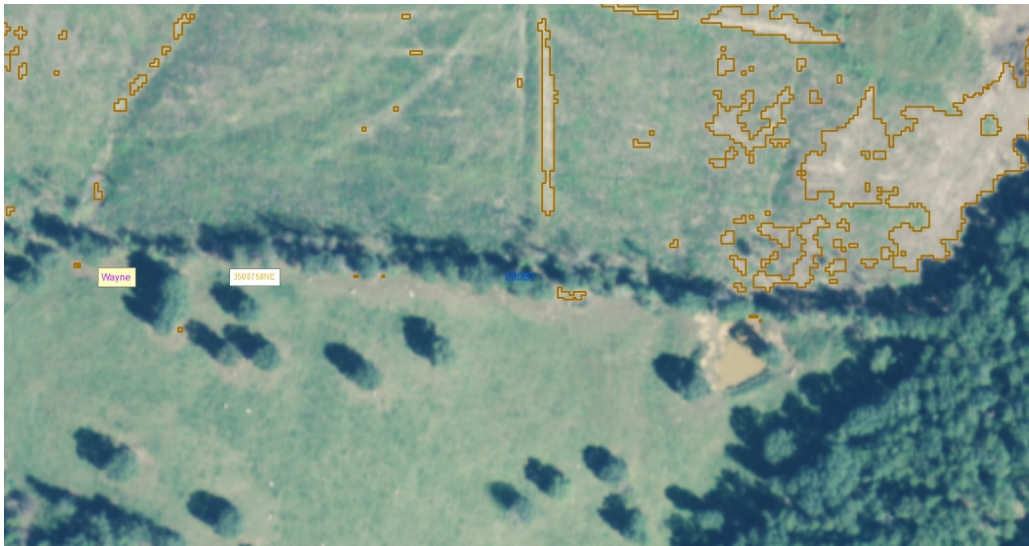


Figure 3. Clearings inside canopy

With photos dating back to 1997, a complete history of a forest can be developed. The forest shown in Figure 5 was primarily hardwood with small areas of pine in the 1997 aerial photo.



Figure 5. Hardwood Forest 1997

The same area is shown in 2008 in Figure 6. Sometime in the 11 years between the photos, the hardwood forest was harvested and the pine stand (the darker area in the upper center area) was thinned. There is no way to determine from the 2008 photo whether the land will continue in forestry or will be converted to an agricultural use.



Figure 6. Pine Plantation 2008

Checking in again on the site in 2010 shows that sometime before 2010 the area was replanted to pine as shown in Figure 7. The planted pines are indicated by the lines of green (seedling rows).



Figure 7. Pine Plantation 2010

The aerial image in 2014 (Figure 8) shows the pine seedlings growing, several areas that were not planted, stream sides that were not harvested, log loadings areas, and roads.



Figure 8. Pine Plantation 2014

After locating all harvest areas across the state, each harvest area is digitized as shown in Figure 9. The GIS system determines the number of acres in each.

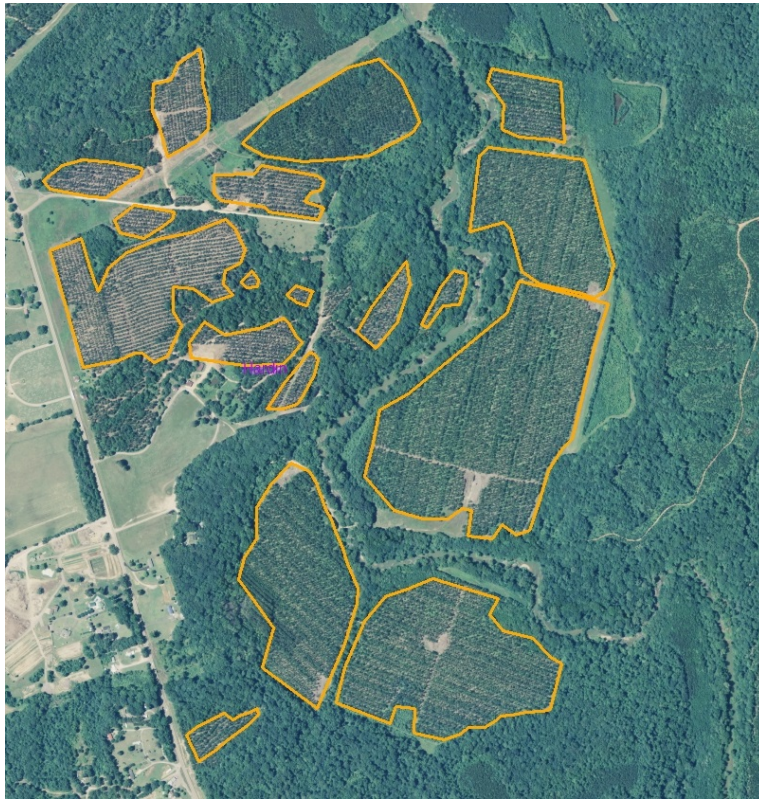


Figure 9. Digitized harvest areas

The entire State has been processed for 2012 canopy and 2014 clearings and about 1/3 has been checked by a geographic information system (GIS) analyst. The project should be completed this summer. All changes in forest cover in the two counties of Hardin and McNairy over the same period are shown in Figure 10.

Yellow areas are forest disturbances such as pine stand thinning, and partial and total harvests of pine and hardwood stands. The blue areas indicate forests that were cleared to make room for agricultural crops.



Figure 10. Forest Disturbances in McNairy and Hardin Counties

One of the most important results from this study will be to determine how sustainable a harvest level is for a county or region. Assuming it takes 80 years to grow a hardwood forest, then cutting more than $1/80^{\text{th}}$ of total forest area per year will result in some period when no trees will be available if all other factors are held constant. Switching to faster growing trees or more intensive management would allow more acres to be harvested in a shorter period of time. For example, Hardin County has approximately 279,000 acres of forest. Based on remote sensing analysis, an average of 3,191 acres were harvested per year in the period between 2012 and 2014. Dividing the total acres by harvest acres yields a rotation of 87 years. If the period 2012 – 2014 is representative of harvest rates over a long period, then it would take 87 years to harvest all the forest in the county. This is a rough estimate that will be refined as harvest areas are classified into pine plantations which produce timber and pulpwood in a much shorter period than hardwood. Eventually the forest can be classified according to productivity since not all hardwood forest areas produce at the same rate. The next step in the study will be to repeat the entire process for the 2010 – 2012 period and when new photos are available for 2016 for the 2014 -2016 period.

Delivered Forest Product Prices in Tennessee

October - December, 2015

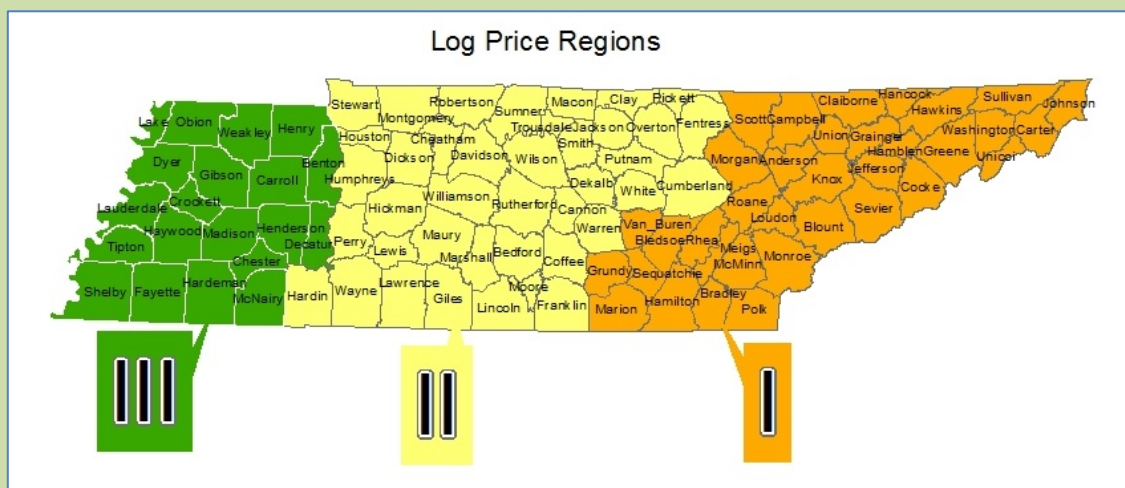
Product	Specifications**	Prices	Region
Cedar Logs	Length-6' to 12' and min DIB 4" at small end	\$50.00 to \$80.00/ton (also \$350.00 to \$560.00+ MBF Cedar 2/3 Rule) Low grade \$14/ton Chipper logs \$50/ton	II & III
Crosstie Logs	Length-8' 8" min DIB 11" and up Must be sound on both ends	<u>Oak</u> Grade 1: \$400/MBF Doyle Grade 2: \$239/MBF Doyle \$63 per ton <u>Mixed Hardwoods</u> Grade 1: \$353/MBF Doyle Grade 2: \$223/MBF Doyle \$65 per ton	I, II & III
Hickory Handle Logs	Each mill will have their own requirements.	Grade 1: \$475/MBF Doyle Grade 2: \$325/MBF Doyle Grade 3: \$150/MBF Doyle	I & II
White Oak Stave Logs	White Oak-Length: 8 ½' min and add on 2' increments (allow 1 knot per 3' of length", and min. DIB 12" at small end)	Grade 1: \$867/MBF Doyle Grade 2: \$677/MBF Doyle Grade 3: not enough data	I & II
Paulownia Logs	Min. length 2 meters + trim allowance (6' 6"+trim) and Min. DIB 8" at small end (Must be slow grown – prefer 8-10 growth rings per inch); season Oct- April	Grade 1 \$850	I, II & III
Pine Pulpwood	Pine: Diameter, length, and species may vary with purchasing company. Consult firm first before cutting	\$26/ton or \$69.55/cord (5350 lbs/ cord)	II & III

Hardwood Pulpwood	Hardwood: Diameter, length, and species may vary with purchasing company. Consult firm first before cutting	\$28/ton or \$81.20/cord (5800 lbs/ cord)	I, II & III
Softwood Logs	Length: 8'-16' and min DIB 6" at small end	Prices are dated. No mills surveyed currently list softwood prices. SY Pine: \$200/MBF Doyle White Pine: \$250/MBF Doyle Hemlock: \$180/MBF Doyle SY Pine CNS: \$25/ton	I & II
Veneer Logs	Prime logs only (specifications vary with buyer).	Red Oak: Average \$723/MBF Doyle White Oak: Average \$1,220/MBF Doyle Walnut: Average \$1,560/MBF Doyle Cherry Average \$916/MBF Doyle Poplar Average \$536/MBF Doyle	I, II & III

*Information is taken from a survey of wood-using industries in Tennessee

**Specifications vary with industries

***All prices are regional averages and are delivered prices per MBF Doyle unless otherwise indicated. They are subject to change and will vary locally. ("+" indicates an increase since our last bulletin; "-" indicates a decrease)



Hardwood Sawlogs*

Species	Region I	Region II	Region III
Red Oak	Grade 1: \$439- Grade 2: \$311- Grade 3: \$194-	Grade 1: \$502- Grade 2: \$396- Grade 3: \$310-	Grade 1: \$578 Grade 2: \$475 Grade 3: \$388-
White Oak	Grade 1: \$518+ Grade 2: \$346- Grade 3: \$215-	Grade 1: \$599+ Grade 2: \$430+ Grade 3: \$365+	Grade 1: \$644+ Grade 2: \$492+ Grade 3: \$359+
Ash	Grade 1: \$346- Grade 2: \$346+ Grade 3: \$194+	Grade 1: \$485- Grade 2: \$327- Grade 3: \$310+	Grade 1: \$600+ Grade 2: \$500+ Grade 3: \$367+
Yellow Poplar	Grade 1: \$336+ Grade 2: \$229+ Grade 3: \$158-	Grade 1: \$366- Grade 2: \$271 Grade 3: \$232	Grade 1: \$379 Grade 2: \$298 Grade 3: \$240
Walnut	Grade 1: \$507+ Grade 2: \$296+ Grade 3: \$180-	Grade 1: \$957+ Grade 2: \$596+ Grade 3: \$579+	Grade 1: \$1,150 Grade 2: \$850 Grade 3: \$533
Cherry	Grade 1: \$379+ Grade 2: \$246- Grade 3: \$167-	Grade 1: \$444- Grade 2: \$323 Grade 3: \$274	Grade 1: \$500 Grade 2: \$392+ Grade 3: \$340+
Hard Maple	Grade 1: \$458+ Grade 2: \$329- Grade 3: \$150-	Grade 1: \$535- Grade 2: \$496- Grade 3: \$327	Grade 1: \$600 Grade 2: \$250 Grade 3: \$300
Hickory	Grade 1: \$426+ Grade 2: \$258+ Grade 3: \$175	Grade 1: \$353- Grade 2: \$327- Grade 3: \$257-	Grade 1: no data Grade 2: \$475+ Grade 3: \$350+
Misc. Hardwoods	Average: \$164-	Average: \$231-	Average: \$364+

Increase from last quarter (+); Decrease from last quarter (-)

**Specifications: (Length: 8'-16'; and Min. DIB 8 " at small end) Delivered Price*

Prices quoted are per thousand board feet (MBF) Doyle Rule delivered to mill. Prices will vary greatly depending on many factors such as weather and mill inventories. Prices received for standing timber will be less than the delivered price based on harvest cost, haul cost and buyer profit:

Standing timber (stumpage) price = delivered price - harvest cost - haul cost - buyer profit



Wanted to Buy:

- ❖ **Hardwood Sawmill:** Foreign company with offices in Taiwan, China and Southeast Asian is looking to expand and is interested in purchasing a hardwood mill in the States. For more information, contact Cleo Fu, Agricultural Marketing Specialist with the USDA Foreign Agricultural Service: +886-2-2705-6536 ext. 242; fucwy@state.gov
- ❖ **Loblolly or shortleaf pine for utility poles:** 36 foot to 76 foot in length (length is determined by diameter). Roadside pricing. Call Doug Curry, Bell Timber for specifications and details. 715-418-9333.
- ❖ **Logs for Export:** An exporting company based out of Southern Illinois is interested in buying veneer logs for export. Any information or bid proposals can be e-mailed to swsveneer@gmail.com or call Derek Wilson at 618-559-7568.

For Sale:

- ❖ **SCHAEFER ENTERPRISES OF WOLF LAKE, INC** –Rely on our experience, established in 1967. Used Parts Shipped Daily for Log Skidders, Crawlers, Loader Backhoes, Excavators, Wheel Loaders and Skid Steers. We have many reconditioned engines and transmissions that are Dyno-Tested. Rebuilt winches, final drives and used tires. If we do not have a part – we can locate it for you on one of our three nationwide parts locators
- ❖ **Parts for:** Allis Chalmers, Athey, Bantam/Koehring, Bobcat, Case, Clark, Daewoo, Dresser, Drott, Fiat Allis, Franklin, Hitachi, Hough, Hyundai, International, John Deere, Kobelco, Komatsu, Leihberr, Linkbelt, Michigan, Mitsubishi, New Holland, New Process, Pettibone, Samsung, Timbco, Timberjack, TreeFarmer, VME, Volvo
- ❖ We have many reconditioned engines and transmissions that are dyno-tested, rebuilt winches, final drives and used tires.
- ❖ Contact a parts professional at: (618) 833-5498 or (800) 626-6046. Ask for Andy, Brad Jill, Joe, Kevin, or Matt if buying. Ask for Jerry or Tom if selling.
- ❖ We are located at 4535 State Route 3 North, Wolf Lake, IL 62998.
- ❖ Check out our inventory at – www.sewlparts.com or you may send email requests to parts@sewlparts.com.

Components from a biofuel thermal treatment plant used to make biochar and other products

A partial listing of what is available: Wood chip/sawdust dryer with cyclone: NG/#2 fuel oil/propane furnace; motors, auger assemblies with motors, stainless steel flue gas ducting, conveyors, airlocks, condensers, air handler, flowmeters and other instruments, electrostatic precipitator, stainless steel storage tanks; climate controlled 16' control room trailer with VFDs, HMI, PLC, kWh meters, circuit breakers, considerable power and sensor wiring, etc.

The skinny on this equipment:

- ❖ Biofuel plant used intermittently for research and development over two years

- ❖ All equipment was in good condition and fully operational upon shutdown, and all equipment with the exception of the dryer cyclone and control room trailer have been kept under roof.
- ❖ Pictures and more detailed information available
- ❖ Arrangements can be made to view and inspect the equipment. Location NW Alabama
- ❖ **Buyer pays no sales commissions**

Owner is anxious to sell so make an offer. This is an unusual opportunity for the right party. Seller lost his lease and must move. Lots of good, useful items in good shape and ready to load out. These items can be used in a variety of ways for a variety of purposes.

Contact Phillip Badger, cell phone 256-762-2886, email: pbadger@bioenergyupdate.com

Other:

- ❖ **"Logs, Chips and Lumber Trucking Company:** West Tennessee company specializes in providing trucking services for area loggers, sawmills and papermills located within a 100 mile radius of Paris, TN. We currently have 20 trucks and over 60 trailers in our fleet for quick "drop and hook" service. Flatbed Trailer and Live Floor Chip Trailer services also available. Fully licensed, bonded and insured. Competitive rates. References available. Call Revel Logging, LLC at 731-642-3944 for more information. "
- ❖ **"ATTENTION LOGGERS!"** "Waverly Wood, LLC" of Waverly, TN is looking to employ additional logging crews, to log their timber tracts; long-term employment possible. All prospective contractors must have workers' compensation and general liability insurance. Also, wanting to buy white oak stave logs and tie logs. Please contact: Mike Phillipi, Timber Procurement Manager or Todd Richardson (Office: 931-296-1455; Mobile: 615-418-0276)

The Tennessee Forest Products Bulletin welcomes those items that you are looking to buy or sell in The Trading Post. Contact Debra Dawson: Debra.Dawson@tn.gov; 615-837-5540; 615-837-5003 (Fax) with your submissions.