



## ALDO LEOPOLD LEGACY CENTER TO OPEN SOON

FPL COLLABORATES WITH THE ALDO LEOPOLD FOUNDATION TO BRING A VISION TO REALITY

*Considered along with other luminaries such as George Perkins Marsh, John Muir, and Gifford Pinchot as the founders of America's conservation movement, Aldo Leopold is one of the giants in natural resources history. Many of Leopold's writings and lessons help define how we in the U.S. Forest Service (USFS) do business today.*



Aldo Leopold Legacy Center. Drawing by Tom Kubala, Kubala Washatko Architects.

*The connection between Leopold and the USFS began in 1909 as Leopold eagerly pursued a career in the newly established agency after graduating from the Yale Forest School. His first field assignment was as an assistant at Apache National Forest in southeastern Arizona. By the age of 24, he had been promoted to the post of supervisor of the Carson National Forest.*

*In 1922, he was instrumental in developing the proposal to manage a portion of the Gila National Forest as a wilderness area, which became the first such official designation on June 3, 1924, 40 years before the passage of the National Wilderness Act, which would legally define the public benefits of wilderness areas.*

*Leopold accepted a transfer in 1924 to the Forest Products Laboratory in Madison, Wisconsin, where he would serve as Assistant Director until 1928, when he left the USFS to conduct game surveys across the country. These surveys would later compel him to write the first textbook on game management and lead him to the University of Wisconsin-Madison, where he went on to build the field of wildlife management.*

*The following is a feature article by guest authors Craig Maier, Communications Coordinator, and Buddy Huffaker, Executive Director, of the Aldo Leopold Foundation.*

**“Acts of creation are ordinarily reserved for gods and poets, but humbler folk may circumvent this restriction if they know how. To plant a pine, for example, one need be neither god nor poet; one need only a shovel...If his back be strong and his shovel sharp, there may be eventually ten thousand. —Aldo Leopold, *A Sand County Almanac*”**



Leopold and family begin reclaiming the land by planting several thousand pine seedlings and shrubs.

Thousands of pines bested the long odds of survival on Aldo Leopold's "worn out sand farm," tax-delinquent land purchased in 1935 for a family retreat and hunting camp. Leopold soon realized the abandoned farm's potential as a laboratory for restoring health to the land. He ordered 3,000 pines from Wisconsin's state nursery, and soon the professor, his wife Estella, and their five children were more than familiar with the *hum* of a sharp shovel slicing the ground.

Planted in a drought year in the waning days of the Dust Bowl, 99.9% of those first pines died. But spring planting at the farm became an annual ritual from 1936 until Leopold's death in 1948. *A Sand County Almanac* was published posthumously in 1949, a classic work which has convinced millions of readers of the need to establish a more ethical relationship with the land we inhabit. Meanwhile, Leopold's pines have found sand and clay, rain and sun, soil nitrogen and carbon dioxide. The wind once howled across a barren landscape but now whispers through groves of red and white pine.

Just down the road from the Leopold shack and farm, near Baraboo, Wisconsin, the Aldo Leopold Legacy Center is nearing completion and its April 22

(continued on pg. 4)

## NEWSLINE TEAM

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Check out our website at  
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## UPCOMING EVENTS

### WOOD & BIOFIBER PLASTIC COMPOSITES

**May 21-23, 2007**—Monona Terrace Community and Convention Center, Madison, Wisconsin. The Forest Products Laboratory and the Forest Products Society will host the 9th International Conference on Wood & Biofiber Plastic Composites to exchange and disseminate information on the latest advances and opportunities for composite materials. <http://www.forestprod.org/woodfiber07announcement.html>

### COOPERATIVE FOREST PRODUCTS TECHNOLOGY TRANSFER

**June 3-8, 2007**—USDA Forest Products Laboratory, Madison, Wisconsin. The USDA Forest Products Laboratory and the State and Private Forestry Technology Transfer Unit will host a National Utilization and Marketing Conference titled "Cooperative Forest Products Technology Transfer". The program will include cooperative technology transfer, traditional and new innovative technology transfer approaches, networking approaches, and building technology transfer relationships. <http://www.fpl.fs.fed.us/notices/events/2007jun3-8--nue&m-conference.html>

### BIOTECHNOLOGY IN THE PULP AND PAPER INDUSTRY

**June 10-14, 2007**—Monona Terrace Community and Convention Center, Madison, Wisconsin. The USDA Forest Products Laboratory and the IOGEN Corporation will host the 10th International Congress on Biotechnology in the Pulp and Paper Industry. Meet and hear experts recognized internationally for their research excellence and industrial experience. [http://www.bact.wisc.edu/icbppi\\_2007/](http://www.bact.wisc.edu/icbppi_2007/)

## NEWS

### FOREST SERVICE SCIENTIST AWARDED FELLOW POSITION BY KEY INTERNATIONAL ORGANIZATION DEDICATED TO GLOBAL SCIENCE ADVANCEMENT

A U.S. Forest Service, Forest Products Laboratory, scientist was recently elected by her peers as a fellow of the American Association for the Advancement of Science (AAAS). This appointment recognizes scientists whose "efforts on behalf of the advancement of science or its applications are scientifically or socially distinguished."

According to the AAAS, Dr. Barbara Illman was elected for outstanding research in applied forestry with a focus on the chemistry of wood biodeterioration. Dr. Illman, who has worked at the laboratory for 20 years, also studies long-term ecological research of fungal-beetle interaction in boreal forests, preventing the introduction of invasive species during global trade, and bioremediation of waste wood treated with environmentally toxic chemicals.

Founded in 1848 as a nonprofit organization, the AAAS members advance science and innovation around the globe as advocates, educators, leaders, and spokespersons. "Considering only a small percentage of scientists are ever elected AAAS Fellows by their peers, this appointment shows the significance and quality of Forest Service research," said Ann Bartuska, deputy chief for Forest Service Research & Development.

# FPL RESEARCH DEMONSTRATION HOUSE UPDATE



**ACCESSIBILITY RAMP:** Our new access ramp is also a durability project using nine different preservative-treated woods, four wood-plastic composite materials, and three naturally decay-resistant species.



**MOISTURE RESEARCH:** Forest Products Laboratory (FPL) is working in cooperation with Syracuse University to measure air pressure, temperature, and relative humidity in the wall cavities. The cellulose insulation is being replaced with fiberglass to match the controlled conditions of the Syracuse lab. The study includes state-of-the-art instrumentation engineered by FPL researchers to supply actual field measurements of moisture and airflow in the wall cavities.

## WESTERN LARCH FLOORING:

Random-length tongue-and-groove flooring, made from western larch harvested as a part of forest restoration, is installed in a bedroom in the house.



## THE RESEARCH DEMONSTRATION HOUSE

was built in 2001 as a cooperative project with APA-The Engineered Wood Association and the Southern Pine Council. Since its inception, the demonstration house has been toured by more than 5,000 visitors. The house is open to the public during regularly scheduled tours at 2 p.m., Monday through Thursday, from April 1 to October 1. To schedule a group tour, contact the Forest Products Laboratory at (608) 231-9200 (<http://www.fpl.fs.fed.us>).

## RAINWATER HARVESTING:

Phase II of the cold-climate rainwater harvesting system has been installed, in addition to the existing irrigation field and rain barrels. This unit filters rainwater from the garage roof to supply the half-bath toilet and the washing machine.



**BIOMAX 5:** This small-scale biomass system, which produces 5 kW of electricity by gasifying wood chips or pellets, will soon provide power for the demonstration house.



## ALDO LEOPOLD LEGACY CENTER TO OPEN SOON *(continued from pg. 1)*



**Aldo Leopold and family by the shack on the farm.**



**“When we see land as a community to which we belong, we may begin to use it with love and respect.”**

grand opening celebration. The future headquarters for the Aldo Leopold Foundation (ALF) will integrate the non-profit organization’s conservation, education, and outreach programs on a three-building campus. Leopold pines are used extensively in the construction.

The Legacy Center is key to ALF’s mission of fostering the land ethic, yet is only one aspect of the foundation’s ambitious Land Ethic Campaign. The \$7.75 million campaign also supports the preservation and restoration of the Leopold shack and farm and the digitization of the vast Leopold archives, along with establishing endow-

ments to support ALF in the future. To date, the foundation has raised over \$6 million through the Land Ethic Campaign.

The Legacy Center will welcome visitors to the Leopold Memorial Reserve, and interpretive exhibits will describe the history of ecological restoration and management and document Leopold’s intimate, life-long relationship with the American landscape. A three-season classroom and a conference center will provide much-needed space to host school groups, workshops, seminars, and conferences.

Many priceless and irreplaceable Leopold artifacts will be housed, archived, and displayed in the Legacy Center. A library and archives will allow scholarly access to digitized Leopold writings, photographs, and sketches, as well as other research materials, dramatically expanding access to these precious resources.

The facilities will demonstrate green-building technologies as familiar as wood-burning stoves and as innovative as geothermal heating and cooling and the state’s largest solar array. ALF and lead partners The Kubala Washatko Architects of Cedarburg, Wisconsin, and Boldt Construction of Appleton, Wisconsin, anticipate meeting the highest standards of the Green Building Council’s Leadership in Energy Education and Design (LEED) certification program.

One organizing principle is to produce as much energy as is consumed at the Legacy Center, commonly referred to as a “net zero” energy balance. This will be achieved by

integrating energy-saving technologies with renewable energy production from the solar panel system and wood stoves.

Another primary goal was to feature wood products produced by thinning the Leopold pines and an oak forest also located on the Leopold Memorial Reserve. Beams and columns were milled at the building site, while paneling, trim, flooring, and siding have been milled and processed an hour away at Samsel’s Sawmill in Hancock, Wisconsin.

In 2003, the ALF learned that the Leopold pines were in critical condition, but cutting these trees was not an easy decision for the family to make. These were trees the children had planted by hand and watered by bucket brigade. “The decision to thin the Leopold pines was closely linked to the final decision to build the Legacy Center,” explained ALF Executive Director Buddy Huffaker. “This is the kind of facility the family has been dreaming about for years, and the potential for the less vigorous pines to build the very framework of the Legacy Center was an irresistible idea,” Huffaker said.

The remaining trees should be more resilient to threats like drought and disease. Healthy white pines could easily survive another 150 years, providing many future generations with a living link to Leopold. The Community Forestry Resource Center reviewed the forest management plan and observed harvest activities, certifying that the thinning met standards for forest health established by the Forest Stewardship Council. Daily harvest activities were also overseen by the Leopold family and ALF staff.

When ALF was discussing plans for the Legacy Center in 2004, FPL’s State and Private Forestry Technology Marketing Unit (TMU) proposed a small-diameter roundwood demonstration project as an opportunity to use suppressed pines in the structure. “We were interested in the idea from the beginning, but we didn’t know the scale at which the round wood could be implemented,” Huffaker said.

ALF Ecologist Steve Swenson was given the complex task of figuring out how to turn a specific stand of trees into the wood products for a 13,000-square-foot public facility. “Our consulting forester selected 450 red and white pines for removal. Because the main objective of our harvest was to improve forest health, they marked the most suppressed trees and trees competing with more vigorous neighbors,” Swenson explained.

As Kubala Washatko made calculations and drew up plans in 2005, the limitations of the marked trees became apparent. “The architects and engineers determined 8-inch by 8-inch beams were the smallest building blocks we could use extensively and still have the strength we needed,” Swenson said. Two stands dominated by red pine had

been suppressed the most, and at least 60 trees had a DBH of only 8 to 10 inches. That meant 60 trees couldn't make an 8x8 of any length.

"We could use some pulp to print a special edition of *A Sand County Almanac* [see sidebar], and we needed pine for paneling and trim, but the ultimate use of these trees was to hold up the Legacy Center," Swenson explained. "To do that, we needed to use these trees in the round," he said.

The Legacy Center's three-season classroom and adjacent stewardship garage were identified as two opportunities to use small-diameter trees. Approximately 30 feet wide, the buildings could be spanned by an innovative truss design developed by Bruce Haroldson, an engineer at Beaudette Consulting Engineers. Based in Missoula, Montana, the firm has partnered with TMU on several round-wood projects in the Rocky Mountains states.

TMU is a FPL unit that specializes in hands-on technology transfer, and has been deeply involved with small-diameter utilization in the West, where forest thinning is a critical need. Using small-diameter trees in construction has been explored as a way to fund thinnings, a treatment desired for improving forest health and reducing the risk of catastrophic fires.

"In 2000, some of the worst forest fires were real close to us down in the Bitterroot Valley," Haroldson said. "There was a lot of discussion about what to do with these overgrown forests." Since then, he has been involved with projects ranging in scale from a visitor kiosk at the 2002 Winter Olympics in Utah to a community library in Darby, Montana.

Small-diameter round wood, especially from suppressed trees, is remarkably strong, noted Mark Knaebe, a round-wood engineering expert with TMU.

A small-diameter tree used in the round rather than cut into square lumber "has an amazing strength advantage—it's at least three times stiffer," Knaebe said.

In faster growing trees, the interior juvenile wood is much weaker than the outer layers. "If you were to cut a 2x4 and have that juvenile wood on the side, that's where you get warped wood. One side wants to shrink and the other doesn't. Why cut off anything, when you can use the whole log?" Knaebe said. In the round, the juvenile wood is protected from shrinking or breaking by the stronger outer growth.

Due to its strength, round wood trusses utilized in the stewardship workshop had advantages over square beams and columns. The trusses span the building without any supporting columns, making the space easier to use for storing equipment and material.



Paper produced from Leopold logs for a special edition of *A Sand County Almanac*.

Looking at economics, construction is the most valuable use for small-diameter material, Knaebe said, yet the option remains underutilized. "The small logs would be more useful if there were enough people who could use them to make buildings. The material from thinnings is going toward bio-energy and mulch at one-tenth or one-thirtieth the value they could be," he said. Most of the wood from thinnings is wasted, Knaebe noted—"The material is usually either left to rot or burned on site."

So far, small-diameter round-wood construction has been limited to demonstration projects with strong public support because

### Printed on Pine— A Special Edition of *A Sand County Almanac*

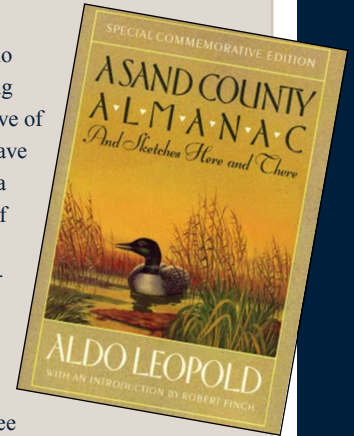
Admirers of Aldo Leopold's writing who share his love of pine will soon have a chance to add a special edition of *A Sand County Almanac* to their shelves.

When the Leopold pines were thinned, tree tops and other materials not suitable for building were destined for anonymity in Wisconsin paper mill vats. With assistance from the Forest Products Laboratory and the UW-Stevens Point Paper Science Laboratory, a portion of the pulp has been transformed into archival-quality paper for printing Leopold's classic work.

FPL Research Scientist Carl Houtmann used an experimental pulping process that is both chlorine- and sulfur-free. The paper industry operates on a low profit margin, Houtmann explained, so reducing the use of expensive chemical treatments is both economically and ecologically beneficial. "That is the core of our mission. We develop technologies that are both cost effective and in the public's best interest," Houtmann said.

At the Paper Science Laboratory, students, staff, and faculty transformed 500 pounds of pine pulp into paper. Other softwoods and hardwoods were added, improving the quality and durability of the finished product. At the lab, students regularly receive hands-on training with equipment worth \$15 million, but this project was a unique opportunity to produce paper for a book.

The harvest edition will be hardcover, with a commemorative jacket and a new introduction. Tentatively priced at \$750, proceeds from the sales have been designated for an endowment fund, securing future financial support for the Aldo Leopold Foundation's education and land stewardship activities. The pines—which provided Leopold a "curious transfusion of courage"—will now provide key dollars for sharing the land ethic with a larger audience of students and private landowners.



### Green Fire; Leopold, the U.S. Forest Service, and the Land Ethic

During the U.S. Forest Service (USFS) national communication conference in Wisconsin this past October, participants were immersed in the life and work of Aldo Leopold and treated to the premiere showing of a short video launching a new partnership between the agency and the Aldo Leopold Foundation.

The new project is a two-hour film titled *Green Fire*, which will build upon the momentum generated by USFS's documentary, *The Greatest Good*. The film will chronicle not only Leopold's life but also how the Land Ethic continues to inspire so much of the conservation work in the 21st century.

This partnership is designed to further inform and inspire society towards Leopold's concept of a Land Ethic. Sally Collins, USFS Associate Chief, stated that a film like this can have an impact not just nationally, but internationally and that the time was right "to be making a film about Aldo Leopold and the impact he has had on conservation." This shared commitment to conservation was formalized with a Memorandum of Understanding (MOU) documenting both parties' intent to continue collaborating. The agreement provides a framework for ongoing partnerships with the Forest Products Laboratory and future projects such as *Green Fire*.



**Forest Products Laboratory employees volunteer by peeling logs for the Aldo Leopold Legacy Center building.**



**Raising the hand-peeled Leopold tree trusses.**

When milling began in February 2006, it also became apparent that more than 80 4×10 rafters in the main building could not be produced using the harvested logs. Swenson advocated substituting 8- to 10-inch-diameter logs for the rafters, and TKWA engineers confirmed that 8-inch-diameter logs would be suitable replacements. Suddenly, round logs would also be a feature in the entrance foyer, exhibit hall, and office area. The new use also increased the number of logs to peel.

Removing the bark from the huge pile of logs promised to be a major effort but needed to be done before the logs could be graded. Once peeled, the wood would also dry better and suffer less insect damage. From April to May 2006, more than 150 volunteers contributed 300 hours to the effort. Twenty-eight FPL employees spent a morning with ALF and peeled 33 logs—more than one 65-foot-long tree per person, and the largest contribution of any single group.

"That was backbreaking work. I don't know how they used to do it all day. But it was also a lot of fun and a great bonding experience for us," said Gordie Blum, FPL communications director. "Since we live and work in this area, we are keenly aware of the Leopold's lasting legacy, and we are very proud to have contributed in some small way to this project."

Once peeled, the logs were graded and cut to the needed lengths, from 35-foot-long top chords of the trusses to 8-foot-long purlins that tie the trusses together along the roofline.

Framing contractor Bachmann Construction began assembling the trusses in July 2006. The crew was experienced in using square material, but it was their first round-wood project. "They took our drawing and went for it. There's a definite learning curve there," Haroldson said.

The Legacy Center is the first small-diameter round log demonstration east of the Mississippi, bringing attention to a new technique for increasing value and reducing waste in eastern pine and hardwood harvests. The Legacy Center's close proximity to Madison, Wisconsin, will also be valuable for FPL's nationwide efforts to promote utilization of small-diameter material. "Once people see these demonstration projects, then they are more apt to want to use the techniques," said Jean Livingston, TMU communications specialist. "The Forest Products Lab draws people from all over the country," she noted—"Visitors can take the idea back home."

*To learn more about the innovative features of the Aldo Leopold Legacy Center and the Grand Opening celebration, visit [www.aldoleopold.org](http://www.aldoleopold.org), and click on "What's New."*

construction costs remain higher than using mass-produced products like 2×4s and plywood. Typical framing is based on 4- by 8-foot sheets of plywood, and trusses built with square lumber use standard, inexpensive stamped metal connectors, Haroldson noted. "We're definitely not there yet, where you could take a pile of logs and standardized connectors and throw together a round wood truss," like the ones designed for the Legacy Center, he said.

Although the timber used in demonstration products surrounds many western communities, the current lack of a distribution infrastructure also increases cost. "Right now, it's very expensive to sort, handle, deal with it, and get it to the right people," Haroldson said.

Using locally harvested material was a key aspect of the Legacy Center's construction. The trees destined for round log use were skidded out of the forest in their full length, and local farmer and conservation partner Luther Farms donated time and equipment to load the logs on a semi-trailer and haul them a mile down the road to the construction site.

**I discovered a recent infestation of what I think is powderpost beetles in some wood I purchased. Could you give me some information on powderpost beetles including their life cycle, how to recognize damage, and how to control them.**

By Rachel Arango, Biological Lab Technician

**POWDERPOST BEETLES:** Two families of beetles—Bostrichidae and Anobiidae—are generally classified under the title powderpost beetles. The common name associated with the Bostrichidae is powderpost beetle; common names for the Anobiidae are deathwatch beetle and spider beetle. Both families can cause both structural and aesthetic damage to wood, and many species have achieved economic importance. Although these are not the only beetles that cause this type of damage in wood, they tend to be the groups most frequently encountered in an urban environment.



**Bostrichidae**

**LIFE CYCLE:** Both families infest dead wood almost exclusively, but they utilize the wood at different stages of seasoning because they have different habitat and food requirements for development. These beetles generally consume sapwood, but they may infest the heartwood as well. Bostrichidae attack primarily hardwood that is seasoning or newly seasoned (dead 10 years or less). Anobiidae attack hardwood or softwood that is seasoned and dry (dead 10+ years). This is an important consideration in determining which insect is causing damage—Bostrichids tend to cause damage in newly built homes, whereas Anobiids have caused extensive damage in historical buildings, barns, and other older structures. Mating generally

occurs immediately after adult emergence. Females then lay eggs in cracks or pores on the wood surface (some females create tunnels in which to lay eggs). Once the egg hatches, the larva burrows further into the wood to complete development. Development depends on several conditions, including moisture, nutritional content of the wood, and presence of fungal decay.

**RECOGNITION OF DAMAGE:** Indications of damage from powderpost beetles include emergence holes (0.8 to 7 mm diameter for Bostrichidae, 1.6 to 3 mm diameter for Anobiidae) and the appearance of frass (debris and excrement). Frass from active infestations is nearly white; old frass from prior infestations is more yellow. The actual appearance of beetles can clearly confirm the identity of the wood-boring beetle.



**Bostrichidae: Lyctinae**



**Hemicoelus sp**

**CAUSES OF INFESTATIONS:** Wood that has been improperly kiln dried or stored for extended periods in humid conditions or in areas that have active infestations is susceptible to infestation. Fire- or wind-damaged wood that has been salvaged for building materials is especially susceptible to infestation. Wood that is unfinished, or with a finish that has worn down, is more susceptible to infestation than is properly finished wood because adult females lay their eggs in exposed pores in the wood surface.

**CONTROL METHODS:** Finishing wood with paint, varnish, shellac, sealer, or wax stops female beetles from laying eggs on the wood by eliminating access to oviposition sites. This will not kill larvae already in the wood. Smaller items can be cold-treated—taking the item from a warm environment to freezing temperatures for 10 days or so. Note, however, that the temperature shock—not the cold itself—is what kills the insects, so the process may need to be repeated a number of times. Heat treatment or re-drying in a kiln will immediately end an infestation. Spraying borates on exposed wood surfaces will discourage further attack. In situations where flooring or other built-in material is attacked, removal of infested material is a good first step in controlling the problem. In severe cases, fumigation may be necessary, though this process tends to be quite expensive.



## NEWSLINE

Published quarterly by  
USDA Forest Service  
Forest Products Laboratory  
One Gifford Pinchot Drive  
Madison, WI 53726-2398  
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Director

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*Winter 2007*

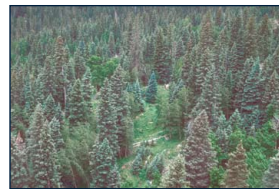
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### WOOD YOU BELIEVE...

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There are 155 national forests and 22 grasslands in the United States. That's over 190 million acres of land. According to the National Visitor Use and Monitoring Program, 205 million people visit national forests and grasslands each year. For more info visit: <http://www.fs.fed.us/recreation/programs/facts/>



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