



Forest Products Laboratory's

Newsline

2012
SUMMER

Nanocellulose Pilot Plant is "A Game Changer"

By James T. Spartz, Public Affairs Specialist

Industry leaders, government officials, and Forest Products Laboratory (FPL) scientists recently celebrated the opening of FPL's new Nanocellulose Pilot Plant, a production facility for renewable, forest-based nanomaterials. The \$1.7 million pilot plant, the first of its kind in the United States, positions FPL as the country's leading producer of forest-based nanomaterials.

Industry representatives from IBM, Lockheed Martin, Ecolab, the pulp and paper industry, and various universities met with keynote speaker Harris Sherman, USDA Natural Resources and Environment Under Secretary, and FPL Acting Director Michael T. Rains, among others, to discuss opportunities for advancing wood-based nanotechnology into new markets. The new facility will bolster an emerging market for wood-derived renewable nanomaterials, helping to spur forest-based job growth and contribute an estimated \$600 billion to the American economy by 2020.

"Forest Service science touches almost everyone in every way, every day," said Rains during a talk to industry leaders, scientists, and other Federal staff. "Forest Service research is now creating innovative science and technology required to keep forests in forestry," said Rains. "From abundant water; clean air; better, safer houses; helping keep wood bats in Major League Baseball; to those sticky stamps that you put on your envelopes when you enjoy mailing a letter... Now, we are about to embark on a new, exciting adventure called wood-based nanotechnology."

"It's a game changer," said Rains about the great potential of the FPL pilot plant. Rains has high hopes that nanocellulose

— Continued on page 9 —



Steve Schmieiding, USDA FS-FPL

Above: FPL unveiled a \$1.7 million pilot plant that will produce renewable, forest-based nanomaterials. The plant is the first of its kind in the United States. Below: Alan Rudie, FPL chemist and project leader, explains the merits of nanocellulose. Attendees were able to see the material up close and take a sample with them.



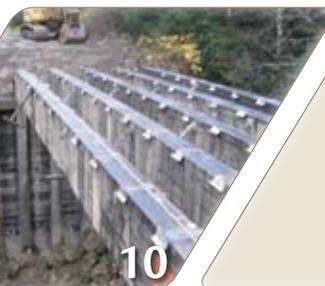
Steve Schmieiding, USDA FS-FPL



3



5



10

In this issue

Upcoming Events.....	2
From Wine Barrels to Wood Floors.....	3
Wood You Believe.....	4
FPL's "People's Gardens" Flourish.....	5
Jakes is Outstanding Early-Career Scientist.....	7
Wood Wise.....	8
Strength in Numbers: Historic Bridge Testing.....	10
Renewable Wood Energy Project Awards.....	12
Blazer Visits for Wood-to-Energy Roundtable.....	14



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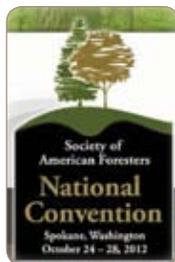
Upcoming Events



International Congress on Yeasts – 2012 Yeasts For a Sustainable Future

August 26–30, 2012, Madison, Wisconsin

The 13th International Congress on Yeasts is sponsored by the International Commission on Yeasts as part of the International Union of Microbiological Societies. It provides an opportunity for presenting the latest research progress in yeast metabolism, physiology, genetics, genomics, regulation, ecology, systematics, phylogeny, food and beverage applications, biofuel production, and clinical applications. For more conference information visit <http://conferencing.uwex.edu/conferences/icy2012/index.cfm>.



2012 Society of American Foresters National Convention

October 24–28, 2012, Spokane, Washington

This year's scientific and technical program brings pieces of forest management into focus. Sessions will focus on ecological resilience, the role of forest management in sustaining forests, and the role of communities and collaborations in resilient forests.

We'll learn from our peers during poster sessions and honor them during our national award program. An evening alumni reception will break the ice on Thursday and allow people to reconnect during the remainder of the meeting. For more conference information, visit <http://www.safnet.org/natcon12/index.cfm>.



2013 International Conference Timber Bridges

September 30–October 3, 2013, Las Vegas, Nevada

The main objective of this conference (ICTB2013) is to show case and discuss the state of the art in timber bridge technology. The mission of the National Center for Wood Transportation Structures (NCWTS) is to bring together academia, government, and industry to efficiently complete research, demonstration, and education that result in durable, cost-effective wood transportation structures to improve the transportation infrastructure of America and the world.

The NCWTS is a center at the Institute for Transportation at Iowa State University and is maintained in partnership with the U.S. Forest Service, Forest Products Laboratory, the Federal Highway Administration, and the National Park Service.

For more conference information, visit <http://www.woodcenter.org/>.

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From Wine Barrels to Wood Floors

FPL Technology Brings Small Business Idea to Life

By Rebecca Wallace, Public Affairs Specialist

It's often said that good things are worth waiting for. Like wine aged in oak barrels or a revolutionary idea. Or perhaps a unique partnership that creatively combines the two, bringing one entrepreneur's dream to reality.

Joe Triglia, owner of Jubilee Flooring in Long Island, N.Y., has spent years working out a way to turn discarded wine barrels into wood flooring. Now, with help from the FPL, his vision is turning into a promising business venture.

In the United States, most wine barrels are made of white oak and their useful life in the wine industry ranges from one to five years, depending on the preference of the vintner. With large vineyards in Napa Valley using as many as 100,000 barrels per year, discarded barrels represent a significant source of wood. Triglia recognized this source and thought there was an opportunity to reuse the barrels for something more valuable than their common fate: being cut in half and sold as garden planters.

"When barrels are made, coopers hand-scrape the insides to release tannins from the wood," explains Triglia. "I thought these markings, along with the patina formed during the fermentation process, created a unique and appealing look for wood flooring."

Joe Triglia, Jubilee Flooring



The finished product: flooring made from repurposed oak wine barrels.



Steve Schmieding, USDA FS-FPL



Above: FPL's John Hunt (left) and Joe Triglia (right) of Jubilee Flooring examine straightened wine barrel staves. Below: The straightened staves are milled into $\frac{3}{4}$ " tongue-and-groove flooring.

Steve Schmieding, USDA FS-FPL



The wood was beautiful, but straightening the curved staves so they could be milled into $\frac{3}{4}$ -inch tongue-and-groove flooring presented a major hurdle.

Initially, Triglia was unable to find anyone in the United States who could help him address the straightening issue. He worked with a partner in China, but the process took 30 days and was energy intensive. "It didn't make sense business-wise, so I had to keep looking," said Triglia. "That's when I found John's paper."

While combing the internet for other solutions for straightening wood, Triglia came across a research paper authored by FPL engineer John Hunt. The paper described using a microwave drying process to straighten lumber.

"It was the answer I was looking for," Triglia said. "I had an idea and John had a working machine that did just what I needed it to do. It seemed that if we combined my

– Continued on page 4 –

business idea with FPL's research we would end up with a product that affects entire industries."

Triglia came to FPL where he and Hunt experimented with the pilot-scale equipment, and the results were promising. The microwave drying process saved more than 50 percent of the energy used in Triglia's previous attempt, and even better, it was fast. Hunt's machine was able to straighten a barrel's worth of staves, which yields 12 square feet of flooring, in just 10 minutes.

Using FPL's equipment helped Triglia figure out what is needed to move on to commercial-scale flooring production. Hunt has a long history of working with the microwave drying equipment and was pleased to see it used so successfully.

"This partnership is a perfect example of what is possible when government and industry work together," says Hunt. "We were able to use research results for a commercial application, turn a low-value waste material into a high-value product, and help advance a small business."

Triglia has patented his method for transforming wooden staves into flooring or paneling, and is currently developing a Cooperative Research and Development Agreement with Hunt to continue their partnership.

Hunt explains that this project has built a solid foundation for further research and will "serve as a springboard for future applications."

Steve Schmieding, USDA FS-FPL



Hunt and Triglia inspect staves just removed from the microwave dryer as Jubilee employee Richard Finnegan loads the next batch.

Triglia agrees and is looking forward to future work with FPL now that he's seen first-hand what a government research facility can do to aid small businesses.

"It's so encouraging that an entrepreneur has a place to go that can help turn their ideas into reality," Triglia says. "Oftentimes you can dream something up but don't have the technical expertise to make it happen, and you have to make every penny count. Coming to FPL was like a revelation—this place had exactly what I needed to move my business forward."



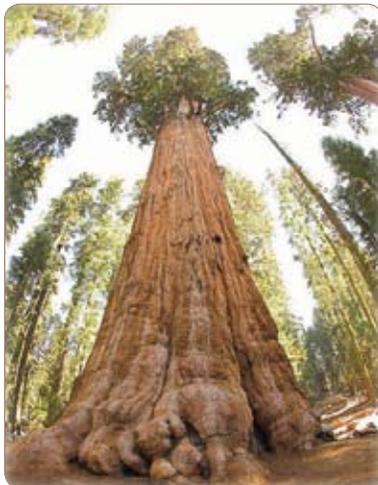
Wood You Believe?

<http://www.shutterstock.com>



Tree seedlings being planted.

<http://www.wikipedia.org>



General Sherman redwood sequoia.

- Trees grow from the top, not from the bottom as is commonly believed. A branch's location on a tree will only move up the trunk a few inches in 1,000 years.
- One of the tallest softwood trees is the General Sherman, a giant redwood sequoia of California. General Sherman is about 275 ft (or 84 m) high with a diameter of 25 ft (or 8 m)!

Source: <http://www.wikipedia.org>
Source: <http://www.weekendgardener.net/tree-information/facts-about-trees-80608.htm>

Here We Grow!

FPL's "People's Gardens" Flourish

By Madelon Wise, Technical Publications Editor

The U.S. Department of Agriculture is celebrating its 150th anniversary this year, and in celebration, Newsline features two different USDA People's Gardens on the FPL campus.

USDA Secretary Vilsack began the People's Garden Initiative—named in honor of President Lincoln's description of USDA as the "People's Department"—in 2009 as an effort to challenge employees to create gardens at USDA facilities. Vilsack said in a February 12, 2012, letter that he "commemorated President Lincoln's 200th birthday by taking a jackhammer to pavement to inaugurate the first USDA People's Garden at Department headquarters in Washington, D.C."

Following Secretary Vilsack's bold initiative, the USDA now has more than 1,500 People's Gardens across the Nation. These gardens, according to the USDA, are all are required to have three components in common: They must benefit the community, be collaboratively created and maintained, and should incorporate sustainable practices.

FPL People's Garden

One of FPL's People's Gardens is raising vegetables to be donated to people in need in the Madison community. Master Gardener Nancy Ross Sutherland heads up FPL's vegetable garden, where she reports that "We are growing tomatoes, cucumbers, squash, zucchini, watermelon, green peppers, and eggplant." The vegetables are being grown in raised beds constructed from Southern pine lumber specimens from a completed FPL research study. Another ingeniously sustainable idea that Nancy implemented was obtaining two cattle watering tanks from a FPL research scientist, who had used them for a water filtration study. Nancy had FPL shop personnel drill holes in the bottom of the tanks for drainage, and she then filled them with soil so that they could serve as a raised bed.

Nancy wanted an easy way to expand the vegetable garden this year and was lucky enough to get some big pots from a friend who was moving. According to Nancy, "Last year we took the most of the produce to Port St. Vincent de Paul, which provides transitional housing for men in the Madison

Right: Butch Blazer, USDA Deputy Under Secretary for Natural Resources and Environment, visited FPL and noted the great work done at FPL People's Garden.

Steve Schmieding, USDA FS-FPL



Madelon Wise, USDA FS-FPL



Above: FPL's Food Forest garden plot before transformation.
Below: The new Food Forest garden flourishing.

Madelon Wise, USDA FS-FPL



area. We also donated some to the WilMar Neighborhood Center in Madison. This year we plan on working with Port St. Vincent and the Community Action Coalition (CAC)." Nancy reports that "Last year we produced and donated 392 pounds of vegetables. This year, we hope to double that amount." The vegetable garden is a success because of the help of many FPL volunteers (Barb Youngs, Bob Ross, Janet Stockhausen, Joseph Jakes, Diane Dietrich, Bruce Smith, Bob Foss, Joe Balczewski, and Lon Yeary).

Hawthorne-Crabapple Food Forest Guild

"Where's the tomatoes?" Well, the FPL People's Food Forest Garden isn't the tomato and lettuce kind of garden but is a showcase of sustainable landscape practices. Nestled at the

– Continued on page 6 –

Continued from page 5 – FPL People’s Garden

top of a hill near our Research Demonstration House, this garden was designed using permaculture principles as a part of the USDA People’s Garden Initiative. This unique garden was designed to provide a sampling of the USDA’s efforts to teach others how to nurture, maintain, and protect a healthy landscape.

Permaculture is a systems-level form of ecological gardening design that uses techniques and practices that combine the best of wildlife gardening, edible landscaping, and native-plant cultivation into one low-maintenance, self-contained, and productive ecosystem. The garden’s bioswales are open-air gently sloping ditches planted with complementary vegetation whose purpose is to catch and retain runoff from buildings and paved surfaces.

When deciding on the garden design, permaculture designer Madelon Wise noticed that the FPL property, with the main buildings built on top of a hill, has some fairly serious erosion and concerns with water. Bare spots in a downward path of the Research Demonstration House’s lawn tell the story of runoff.

As more buildings and roads are constructed, runoff has become an increasing concern because roofs, roads, parking lots, sidewalks, driveways, and other hard surfaces are impervious to rain. Virtually all the rain that falls on these surfaces has nowhere to go but downhill, fast. As a result, flooding and soil erosion have increased in frequency and severity.

Much of the soil washed off vacant lots, cleared land, uncontrolled construction sites, and from road cuts is carried into streams, storm water sewers, rivers, and lakes. This runoff will

Steve Schmieling, USDA FS-FPL



Steve Schmieling, USDA FS-FPL



FPL employees and community volunteers transform an expanse of lawn into a Permaculture Garden that addresses runoff concerns, provides beauty and food, and is full of pollinators and wildlife.

likely include a variety of pollutants: metals from downspouts and pipes, paints, brake linings, engine drippings, and residue from tires join nutrients from lawn fertilizers, detergents, leaves, and animal wastes.

To address our concerns about runoff and to provide both beauty and food, we designed a guild (a community of supportive plants) for the understory of established trees for our People’s Garden. In permaculture, certain botanicals work together as “guilds” to conserve water, ward off predatory insects and animals, choke out weeds, build soil, grow edible produce, and encourage beneficial insects and birds.

Three years after its installation, the complementary community of plants in the Permaculture Garden is well established, and we have observed that the trees, particularly the large hawthorn, have grown and flourished. The garden is full of pollinators of all kinds and wildlife, most notably a pair of sand hill cranes.

How do pollinators and wildlife benefit our community? According to the USDA (http://plants.usda.gov/pollinators/Native_Pollinators.pdf), “Pollination is an ecosystem process that has evolved over millions of years to benefit both flowering plants and pollinators.” No pollination, no food!

Steve Schmieling, USDA FS-FPL



FPL employees (left to right) Nancy Ross Sutherland, Janet Stockhausen, Robert Ross, and Bonnie Johnston harvest vegetables for donation to the Madison community.

However, just as human activities have created impervious surfaces and exacerbated runoff, human activities have also destroyed and fragmented many native pollinator habitats. Therefore, we must consciously create ecosystems that bring in pollinators of all kinds.

The USDA tells us, "To attract native pollinators, an area must have adequate sources of food, shelter, water, and nesting sites. The easiest way to attract native pollinators is to plant gardens or meadows that contain a diversity of native wildflowers, trees, and shrubs. A variety of wildflowers and native grasses will provide native pollinators with food (nectar, pollen, and/or larval host plants). Trees and dense shrubbery provide important shelter, nesting, and overwintering areas for pollinators. To maximize food and shelter, landowners should include gardens, fruit-bearing trees and shrubs, thickets and hedgerows of flowering shrubs, and set-asides (areas that are not mowed) in their plans. Due to differing preferences among pollinator species, planted areas should contain varying levels of vegetation and areas of sun, partial shade, and full shade. Plantings should be done in locations that are sheltered from the wind."

FPL's Food Forest garden fits this description very well. The garden's fruiting shrubs (currants, aronia, elderberry, and dwarf Nanking cherries) are now fruiting abundantly. Other plants in the berms and around the trees all have specific



Steve Schmieding, USDA FS-FPL

Madelon Wise, curator of FPL's Permaculture Garden.

purposes for the guild: insectory plants (yarrow, borage, nasturtium, allium, and bergamot) have blooms that attract pollinators; nitrogen-fixing plants (lupines, clover, and prairie indigo) capture free nitrogen from the atmosphere and convert it into a form of nitrogen that can be absorbed by plants; and dynamic accumulators (comfrey, allium, and daylilies) are plants whose deep roots bring up trace minerals from the soil. Together, these classes of plants provide the guild that supports the trees.

This oasis of beauty on the FPL campus quietly meets USDA guidelines of improving water quality and providing wildlife habitat.



FPL Researcher Named Outstanding Early-Career Scientist

Joseph Jakes Honored with Presidential Award

President Obama has named Dr. Joseph Jakes as one of 96 researchers to receive the Presidential Early Career Award for Scientists and Engineers. This is the highest Federal honor bestowed on early-career science and engineering professionals.

Jakes is a research materials engineer at the FPL and a 2010 University of Wisconsin (UW) graduate. He is one of three early career scientists from within the Department of Agriculture to garner the 2012 award. Impressively, it is the second year running that an FPL scientist has received this honor. In 2011, Samuel Zelinka, also a research materials engineer at FPL, was similarly recognized.

"It is a great honor for me to receive this award," says Jakes. "I am fortunate to work with many great researchers at the Forest Products Laboratory and to have the opportunity to absorb their wealth of knowledge."

Even better, says Jakes, is the freedom he's been given in the early years of his research career to pursue high-impact research areas. "It is very satisfying to identify important



Steve Schmieding, USDA FS-FPL

USDA Under Secretary Harris Sherman (left) and FPL Acting Director Michael T. Rains (right) congratulate FPL materials engineer Joseph Jakes (center) on receiving the highest Federal honor bestowed upon early-career science and engineering professionals.

research problems, develop and execute the methodology to solve the problems, and finally disseminate the solutions to help others."

Jakes's expertise is in the development and employment of methodology to understand material properties at the smallest lengths possible, the nanoscale. In forest products research, his efforts are leading to improved wood adhesives and the development of new high-performance wood-based composite materials, including those utilizing nanocellulose. Ultimately,

— Continued on page 8 —

Jakes' goal is the development of new and improved forest products that lead to the efficient utilization and management of forest resources.

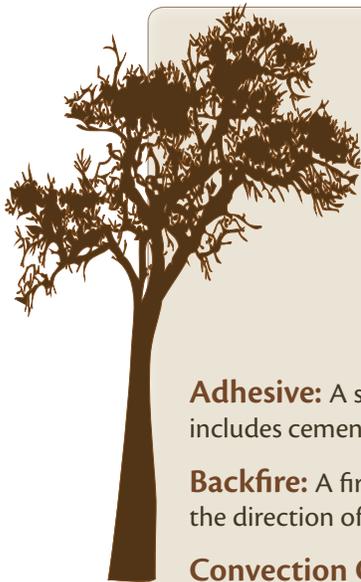
"We are very proud of Joseph's accomplishments, and all of FPL shares in the pride of this national honor," said Greg Schueneman, FPL supervisory research materials engineer. "Joseph started at FPL as a student employee, under Professor Don Stone at UW. He basically came of age at FPL, scientifically speaking, and has quickly risen to make an impact on the national and international stage."

The Presidential early career awards embody the high priority the Obama Administration places on producing outstanding scientists and engineers to advance the Nation's goals, tackle grand challenges, and contribute to the American economy.

"Discoveries in science and technology not only strengthen our economy, they inspire us as a people," President Obama said. "The impressive accomplishments of today's awardees so early in their careers promise even greater advances in the years ahead."



Wood Wise—Terms from the World of Wood



To acknowledge the hard work and dedication of our Forest Service colleagues during the challenging 2012 fire season, this edition of Wood Wise includes words from the world of wildfire.

Although a connection to forest products and wildfire may seem tenuous, thinning overgrown forests to remove dense undergrowth helps reduce the threat of catastrophic wildfire and the thinnings can be used for other value-added products. Using excess material for bioenergy purposes, composite materials, and even nanotechnology can help create jobs and improve the economy of thinning projects. For example, treating 123,000 acres in fiscal year 2011 contributed \$21 million to local economies across the United States.

Adhesive: A substance capable of holding materials together by surface attachment. It is a general term and includes cements, mucilage, and paste, as well as glue.

Backfire: A fire set along the inner edge of a fireline to consume the fuel in the path of a wildfire or change the direction of force of the fire's convection column. Synonym: Burn Out.

Convection Column: The rising column of gases, smoke, fly ash, particulates, and other debris produced by a fire. The column has a strong vertical component indicating that buoyant forces override the ambient surface wind. Synonym: Smoke Plume.

Daily Activity Level: In fire danger rating, a subjective estimate of the degree of activity of a potential human-caused fire source relative to that which is normally experienced. Fire activity levels are defined as None, Low, Normal, High, and Extreme. Part of the National Fire Danger Rating System.

Fire Front: The part of a fire where continuous flaming combustion is occurring. Unless otherwise specified, the fire front is assumed to be the leading edge of the fire perimeter.

Fireline: The part of a containment or control line that is scraped or dug to mineral soil.

Pulaski: A combination chopping and trenching tool widely used in fireline construction, which combines a single-bitted axe blade with a narrow adze-like trenching blade fitted to a straight handle.

Wildfire: An unplanned, unwanted wildland fire including unauthorized human-caused fires, escaped wildland fire use events, escaped prescribed fire projects, and all other fires where the objective is to put the fire out. Synonyms: Uncontrolled Fire, Wildland Fire

Adapted from the National Wildfire Coordinating Group glossary of wildland fire terminology. Available: <http://www.nwcg.gov/pms/pubs/glossary/index.htm>

Continued from page 1 – Nanocellulose Pilot Plant is “A Game Changer”

research can use woody material removed from overgrown forests to reduce the potential for catastrophic wildfire while adding value to biomass from forest thinning projects. FPL’s new facility will aid in the commercialization of nanocellulosic materials by providing researchers and early adopters with working quantities of both cellulose nanocrystals and nanofibrils.

Nanocellulose-based materials can be stronger than Kevlar fiber and provide high strength with low weight. Such attributes have attracted the interest of the Department of Defense for use in lightweight armor and ballistic glass as well as companies in the automotive, aerospace, electronics, consumer products, and medical device industries.

Echoing Rains, Under Secretary Harris Sherman also called the pilot plant a “game changer,” describing the exciting advances being made in the field of wood nanotechnology at the FPL.

I am excited by this bold and new frontier,” said Sherman in his keynote address. “We’re moving to a whole new world.”

But in a time of tight budgets, the Forest Service alone cannot advance nanotechnology, said Sherman. “We need to build our public/private partnerships.”

Sherman stressed that he welcomes discussion with industry leaders about expanding cooperation at the Federal level to develop effective partnerships. “My door is open... to talking about how we can expand at the Federal level our resources and commitment to what is occurring here today,” Sherman said. Such partnerships demonstrate how “we are all stepping to the plate, rolling up our sleeves, and putting our shoulder to the wheel.”



Steve Schmieding, USDA FS-FPL



USDA Under Secretary Harris Sherman met with FPL engineer John Hunt (right) and representatives from Noble Environmental Technologies, a long-time partner of FPL in the development and commercialization of light-weight, high-strength composite panels.

Steve Schmieding, USDA FS-FPL



FPL chemical engineer Rick Reiner (right) toured Under Secretary Sherman and Beth Cormier of Agenda 2020 through the pilot plant, explaining its capabilities for producing nanocellulose and the promise this new material offers to a wide variety of industries.

Steve Schmieding, USDA FS-FPL



FPL’s nanocellulose pilot plant will aid in the commercialization of these materials by providing researchers and early adopters with working quantities of both cellulose nanocrystals and nanofibrils.

Strength in Numbers

Collaboration Supports Historic Bridge Beam Testing

By James T. Spartz, Public Affairs Specialist

The U.S. Forest Service has often used timber components to build bridges, many of which connect some of the most remote back-country roads in the nation. About 4,100 bridges using timber as a primary structural component remain in the National Forest System highway network. Many of these bridges are made of glued-laminated (glulam) timber materials. Glulam beams are manufactured using dimension lumber and industrial-strength waterproof adhesives to bond the many layers together into one solid piece. Though durable for decades of use, timber bridges are eventually subject to load restrictions like any other bridge structure.

A number of glulam girder bridges in the National Forest System are now facing restricted load capacities simply because of their age, even though they are otherwise in satisfactory condition. These bridges use timber girders that were manufactured prior to 1970, when the American Institute of Timber Construction first introduced a national standard for tension lamination quality. The “tension” laminate uses higher-grade lumber to create the bottom layer of a glulam beam, which is critical for its bending strength. Because safe load-carrying capacities must be assigned to all bridges, more than 160 timber bridge structures throughout the National Forest System could be affected by new restrictions. Restricting weight limits for vehicles crossing over a remote National Forest road bridge can have severe implications for fire and rescue operations critical to the health and safety of the forests and the people who use them.

In 2009, Forest Service engineers began the process of decommissioning the Jenny Creek Bridge, an older glulam structure near the village of Kake, on Kupreanof Island, in southeast Alaska. Located within the Tongass National Forest, America’s largest National Forest, the original bridge was installed in

USDA FS-Region 10 Engineering



Deconstructing the Jenny Creek Bridge on Kupreanof Island, Alaska, to salvage glulam girders.

1967 with four primary girders. In 1978 it was modified by adding two exterior glulam beams to replace and widen the deck. The four interior girders, however, are assumed to be manufactured without specially graded tension laminations. The 2009 reconstruction project provided a unique opportunity for full-scale testing of salvaged glulam bridge beams in a laboratory setting to directly measure their ultimate load capacity using standardized laboratory test methods. FPL researchers jumped at the chance. Through a coordinated effort by Forest Service (FS) engineers from the Pacific Northwest region (FS-Region 6), Alaska (FS-Region 10), and the FPL, arrangements for laboratory strength tests were made.

“Working on projects like this is very rewarding,” says Jim Wacker, FPL’s lead research general engineer for this project. “The testing done on these historic bridges can help field engineers and policy-makers make informed decisions about the current status and future use of these vital links in our National Forest transportation network.”

Bridges using glulam girders manufactured prior to 1970 are facing reduced load ratings, says Wacker. New restrictions would require that signs be installed to indicate load limits, and many bridges would be slated for replacement. The average replacement cost per bridge is about \$300,000. Several bridges would need immediate replacement because of their vital service towards forest fire suppression and other public safety responsibilities. Replacing all the pre-1970 glulam bridges would potentially cost taxpayers around \$48 million dollars.

The cost of transporting the 50-foot-long glulam girders from the Jenny Creek Bridge was a barrier until Economic

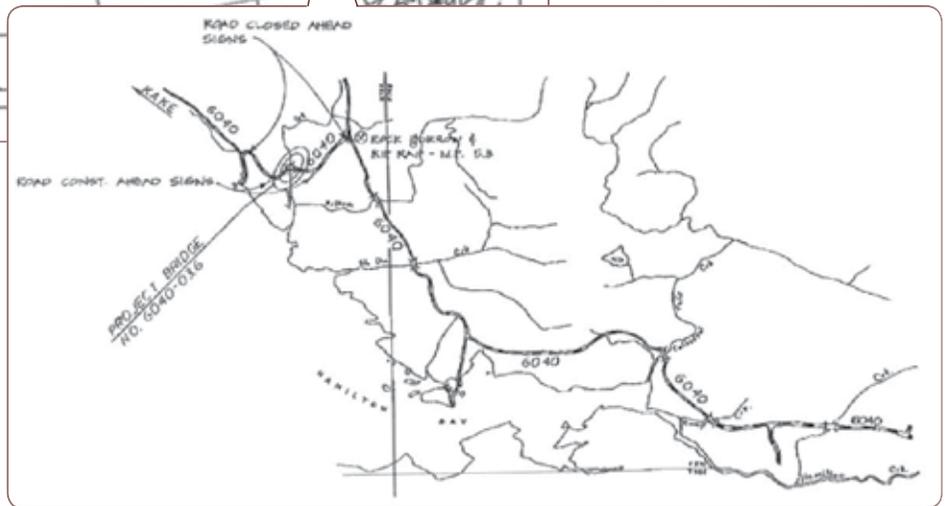
USDA FS-Region 10 Engineering



All six 6,500-pound glulam beams loaded and ready to move.



Above: Key map of Jenny Creek Bridge located on Kupreanof Island, near the village of Kake, Alaska.
 Right: Close-up of bridge location.



“The testing done on these historic bridges can help field engineers and policy-makers make informed decisions about the current status and future use of these vital links in our National Forest transportation network.” Jim Wacker

Recovery (Stimulus) funds became available through the U.S. Department of Transportation’s Federal Highway Administration (FHWA). After being carefully removed and marked to indicate locations in the original bridge structure, the girders were shipped to a nearby port where all six beams were barged to Seattle, Wash. From there they were loaded on a flatbed truck and delivered to the FPL in Madison, Wisconsin.

“This has truly been a group effort,” says Wacker, noting the extensive collaboration needed to coordinate such a project. “It wouldn’t have been possible without the combined work of my other Forest Service colleagues, the FHWA, and all the folks here at FPL.” Wacker has been collaborating on this project with Dave Strahl and Rod Dell’Andrea, FS engineers from the Pacific Northwest Engineering Structures unit and Alaska Engineering Structures unit, respectively, and Scott Groenier of the FS Missoula Technology and Development Center.

Tests are currently being conducted in FPL’s Engineering Mechanics and Remote Sensing Laboratory, which is one of the only facilities in the world with the capacity to perform bending strength tests for such large beams. Each girder is approximately 50 feet long, 40-5/8 inches deep, and 14-1/2 inches wide and

weighs about 6,500 pounds. The creosote-treated beams are made of Douglas-fir lumber. A variety of nondestructive readings have been taken at several locations along each beam to assess their internal condition.

Research is needed to verify whether or not in-service glulam bridge girders manufactured prior to 1970 are still safe. A key focus during a preliminary series of live-load field tests, performed on a number of bridges in Oregon and Washington in 2009 and 2010, was gathering details about the glulam girder laminations in the tension zone. During these extensive tests, many material properties of various glulam beams were assessed. Core samples were taken to determine the wood species via microscopic analysis, and the locations of glued scarf joints and knots in the girder’s tension zones were recorded. Sound-wave testing was also performed to learn more about the internal integrity of the tension laminations. These results, along with laboratory research accomplished at the FPL, will form the basis for a new load-rating strategy and should provide engineers with increased confidence in assigning a safe load capacity to these historic first-generation glulam girder bridges.



Forest Service Awards Nearly \$4 Million for Renewable Wood Energy Projects



By Rebecca Wallace, Public Affairs Specialist

The U.S. Forest Service announced the award of nearly \$4 million in grants for wood energy projects around the country to help expand regional economies and create new jobs. The grants, totaling \$3.92 million, will be distributed to 20 small businesses, tribes, and community groups to develop renewable energy projects that require engineering services.

“Woody biomass is a valuable part of America’s clean energy future as we work to decrease our dependence on foreign oil,” said Agriculture Secretary Tom Vilsack. “Projects like these will help grow local economies, create new jobs, and improve and protect our forests. We will need architects and engineers to design these plants, skilled laborers to build them, and well-trained technicians to operate them.”

The projects will use woody material such as beetle-killed trees removed from forests to aid in wildfire prevention. The material will then be processed in bioenergy facilities to produce green energy for heating and electricity. The awardees will use funds from the Woody Biomass Utilization Grant program to secure the engineering services necessary for final design, permitting, and cost analysis.

“The Forest Service works in more than 7,000 communities across the country to support projects that provide green jobs and boost local economies,” said U.S. Forest Service Chief Tom Tidwell.

“These grants continue our legacy of improving access to affordable energy for rural schools, community centers, universities, and small businesses.”

The grant program, administered by FPL’s Technology Marketing Unit, helps applicants complete the necessary design work needed to secure public or private investment for construction. Examples of projects include the engineering design of a woody biomass boiler for steam at a sawmill, a nonpressurized hot water system for a hospital or school, and a biomass power generation facility.

The Forest Service selected 20 small businesses and community groups as grant recipients for these awards in 2012. The

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Small businesses, tribes, and community groups are finding ways to use woody biomass for energy.

recipients were chosen from 34 applications. According to the requirements, all 20 recipients provided at least 20 percent of the total project cost. Non-federal matching funds total nearly \$8 million.

2012 Woody Biomass Utilization Grantees

California Department of Forestry

Sacramento, California

\$124,875

City of Montpelier

Montpelier, Vermont

\$248,556

City of Nulato

Nulato, Alaska

\$40,420

Clearwater Soil and Water Conservation District

Orofino, Idaho

\$110,000

Coquille Economic Development Corporation

North Bend, Oregon

\$145,000

County of Sullivan New Hampshire

Newport, New Hampshire

\$250,000

Evergreen Clean Energy

Gypsum, Colorado
\$250,000

F.H. Stoltze Land and Lumber Company

Columbia Falls, Montana
\$250,000

Greenway Renewable Power LLC

LaGrange, Georgia
\$250,000

Longwood University

Farmville, Virginia
\$250,000

Mineral Community Hospital

Superior Montana
\$190,000

Nippon Paper Industries USA Co. Ltd

Port Angeles, Washington
\$250,000

Oregon Military Department

Salem, Oregon
\$250,000

Plumas Rural Services

Quincy, California
\$70,125

Port Angeles Hardwood LLC

Port Angeles, Washington
\$250,000

Quinault Indian Nation

Taholah, Washington
\$205,000

Riley County Schools

Riley, Kansas
\$90,000

Sanpete Valley Clean Energy LLC

Salem, Utah
\$250,000

Southern Oregon University

Ashland, Oregon
\$250,000

**Yosemite/Sequoia Resource Conservation
and Development Council**

North Fork, California
\$134,225

The Forest Service Woody Biomass Utilization Grant program commenced in 2005 and provides more than \$36 million toward various projects, ranging from biomass boilers for schools to helping businesses acquire equipment that improves processing efficiencies. During this time period, more than 150 grants have been awarded to small businesses, non-profits, tribes, and local state agencies.

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Funded projects use woody material removed from forests for wildfire prevention to produce green energy for heating and electricity.

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USDA Deputy Under Secretary Butch Blazer at FPL for Wood-to-Energy Roundtable

By James T. Spartz, Public Affairs Specialist

Arthur “Butch” Blazer, USDA Deputy Under Secretary for Natural Resources and Environment, visited the FPL in Madison, Wis., recently to talk about wood-to-energy concerns in Wisconsin and the Midwest. Following a tour of FPL facilities and discussions with several project leaders, Blazer gathered a group of regional wood bioenergy leaders for an afternoon listening session.

Initiating the discussion, Blazer expressed his strong interest in being part of the discussion on the role of forest products in the renewable energy field. Blazer, who has had a long tenure with USDA and spent eight years as New Mexico’s state forester, stated his desire for an active, positive, and inclusive discussion.

Steve Schmieding, USDA FS-FPL



Among the participants at the listening session were wood scientists and technology transfer authorities from FPL and the Forest Service’s Northern Research Station, representatives from the logging and paper industries, academics from the University of Wisconsin–Madison and its Great Lakes Bioenergy Resource Center, and top state natural resources officials. The discussion was moderated by Alan Rudie, supervisory research chemist at FPL and project leader for the new nanocellulose pilot plant at FPL.

Themes of the afternoon’s discussion included sustainability and job growth in regional forestry sectors, transportation and supply-chain issues, economies of scale, collaboration and cooperation among diverse natural resources entities, and the development of innovative markets for new and existing wood-to-energy products. When theories are put into practice, as was stressed by several participants, projects must take into account the limits of current transportation infrastructure and the long-term goals of providing sustainable, regional job growth. Forest product markets, including those for energy, must be diversified enough to provide long-term stability in any given forest-based economy.

Clearer communication was also stressed as a means to effective public engagement and community outreach. Developing consistent terminology for bioenergy communications was deemed essential. Engagement with diverse populations, including both urban and rural young people, to provide rationale for the healthy management of Federal forest lands was another active discussion topic. Effective outreach, proactive community engagement, and active discussions among professionals within existing forestry sectors help promote what Wisconsin State Forester Paul DeLong referred to as the “social license” for landowners to do forestry—to harvest and sell wood through active, sustainable forest management in order to satisfy various environmental, social, and economic

Steve Schmieding, USDA FS-FPL



Roundtable discussion focusing on wood-to-energy concerns in Wisconsin and the Midwest.

Steve Schmieding, USDA FS-FPL



Wisconsin State Forester Paul DeLong addresses the group.

values. Certification programs, such as Wisconsin's Managed Forest Law, have helped with this, said DeLong.

"We must be wary of any one-size-fits-all solutions," said DeLong. "Diversity of markets is huge."

The key, DeLong said, is promoting synergistic growth where new markets are developed to strengthen existing efforts rather than crowd them out.

Returning to a theme brought up earlier in the session, Blazer restated his belief that it is important to reach out to young people who are asking the common question of "Why are we cutting trees down?" What we need to get across, said Blazer, is that the practice of forestry can be and is done "in a very respectful way... in a way that is helpful." In everything we do, Blazer said, there must be a balance.

Creating forest management plans that reflect the localized needs of the ecosystem and communities of any given region is "critically important," said Blazer. Speaking of the controversial new planning rule and its implementation, Blazer stressed that its success hinges on the active participation of those involved, from those in the forests on up to the Federal level. "I'm optimistic that it's going to happen."

Using what he heard at the FPL session, and similar recent meetings in Santa Fe and Seattle, affords Blazer the ability to incorporate insights and recommendations to inform his contacts in Washington, D.C. Engaging in conversations about bioenergy across many mission areas within USDA and other agencies, such as the Department of Energy and the

Department of Housing and Urban Development, for example, is a primary goal for Blazer. In his concluding remarks, Blazer stated that the 1.5-hour listening session had been "very encouraging."

"There is still work to do, of course," said Blazer, "but you're headed in the right direction."



Steve Schmieding, USDA FS-FPL



Mr. Blazer met with FPL leadership, including FPL Assistant Director Mike Ritter (above), and toured the Laboratory's extensive research facilities.

Steve Schmieding, USDA FS-FPL



Steve Schmieding, USDA FS-FPL



Mr. Blazer met one-on-one with several researchers including Carol Clausen (above), to learn more about specific research projects and how they support the missions of FPL, the Forest Service, and the USDA.



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Newsline

In this issue

Nanocellulose Pilot Plant is a “Game Changer”	1
Upcoming Events	2
From Wine Barrels to Wood Floors: FPL Technology Brings Small Business Idea to Life	3
Here We Grow: FPL “People’s Gardens” Flourish.....	5
FPL Researcher Named Outstanding Early-Career Scientist: Joseph Jakes Honored with Presidential Award.....	7
Wood Wise—Terms from the World of Wood.....	8
Strength in Numbers: Collaboration Supports Historic Bridge Beam Testing.....	10
Forest Service Awards Nearly 4 Million for Renewable Wood Energy Projects.....	12
USDA Deputy Under Secretary Butch Blazer at FPL for Wood-to-Energy Roundtable	14

