

Utah Forest News

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Logan Lab Measures Beetle Timing to Improve Prevention Strategies

Bark beetle scientists from the Rocky Mountain Research Station in Logan are paying close attention to beetles in Logan Canyon, in forests across California, in northern Washington, and in Helena, Montana, to understand geographic variability in the timing of the beetles' emergence. This will help them to understand the appropriate timing of preventative measures that land managers might employ to keep these insects in check.



A mountain pine beetle from Logan Canyon on a data sheet.

Mountain pine beetles are just one of several different types of bark beetles found in Utah. Another common bark beetle is the spruce beetle, which has been very active in Utah over the past several years (see UFN Summer 2010.) All bark beetles are host-specific, meaning that certain beetle species only attack certain tree species. Mountain pine beetles will only attack pine trees and spruce beetles will only attack spruce trees, for example.

During the summer adult bark beetles leave the tree that they have already killed, looking for living trees

to infest. They burrow through the bark of green trees and each female produces about 75 eggs. The eggs are laid in a vertical gallery, where they hatch into larvae

before winter and tunnel horizontally away from the egg gallery, producing a characteristic pattern inside the bark of a tree or log, visible when the bark is removed. The larvae overwinter in the phloem, the thin, moist layer of living cells between the bark and the wood. The larvae are able to survive winter temperatures by producing their own antifreeze-like chemicals.

In the spring, they resume feeding until they go through several life stages to become adults the next summer, when they emerge from their host tree and

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fly onto fresh green trees nearby, completing a one-year life cycle.

Some say that climate change is causing mountain pine beetles to have more than one generation in a year. At high elevations, because of the cold temperatures, mountain pine beetles have typically required 2 or 3 years to complete a life-cycle. With increasing temperatures the past several decades, some populations in high elevation pines are now developing in a single year. But, more than one generation in a year remains undocumented with mountain pine beetles, according to Dr. Barbara Bentz, research entomologist with the USDA Forest Service Rocky Mountain Research Station in Logan. Bentz says that their lab is following individual trees throughout the beetle's cycle, and so far they have not seen multiple generations in one year.

To track the individual beetles, the crew from the lab uses push-pins to track the point of attack for each individual beetle. The beetle attack points are color coordinated according to the day of attack. Cords are used to divide the tree into four quadrants according to aspect: north, east, south, and west. The idea is to look for relationships between the day they

are attacked and the aspect on which they are attacked. The trees are also wired for phloem (inside bark) temperature. Sensors record air temperature and relative humidity, again looking for relationships between environmental conditions and timing of attack, development of individuals throughout the year, and eventual emergence the following summer.



Greta Schen-Langenheim samples fungus from a mountain pine beetle-infested lodgepole pine tree in Logan Canyon.



These red-needled limber pines at the Beaver Mountain turn-off are the first hints that mountain pine beetles are active in Logan Canyon.

Documenting and monitoring the timing and cycles of mountain pine beetles is just one of many projects going on in Bentz's lab. Mostly funded through competitive grants, the lab is cooperating with scientists at Utah State University and the University of Montana to measure the timing and dispersal of fungi associated with the beetles. When mountain pine beetles attack a tree and begin feeding, they bring two species of fungi with them, carried on their bodies and in specialized structures on their mouths.

Bark beetles tunnel beneath the bark in the creation of their egg galleries, which girdle the tree, stopping the flow of water and nutrients between the roots and the needles. It is not known, however, in the case of mountain pine beetles, whether it is this girdling action that kills the tree, or whether the tree is killed by the blue stain fungus that rides on the backs and in the

mouths of the beetles. The developing larvae feed on the fungi in the phloem, obtaining vital nutrients they can't get from the tree. The fungi get a free ride to a new tree when the mountain pine beetle emerges during the summer, making this a symbiotic relationship.

Blue stain fungus creates a characteristic blue color in the sapwood of pine trees killed by mountain pine beetles. It does not affect the structure of the wood so much as the appearance. In some cases it can reduce the value of logs that landowners get from a sawmill, though because it is a "specialty product" it can increase the cost of the wood purchased at the lumber yard.

The scientists are also tracking what the parent beetles do after they lay their eggs in the summer. New research has suggested that these parents may survive over the winter in the tree (as winter temperatures have warmed), then emerge from the tree in the spring and potentially attack a new tree and lay a second set of eggs. If this is the case, then the parents and their offspring (brood adults) would be contributing to tree kill the next summer – a double whammy for the trees. Scientists have long thought it was just the brood adults attacking new trees, and that parent adults died in the winter after laying only one set of eggs.

For this study, forest entomologists hike to the study-site each day during the peak of the emergence, which lasts from late June through most of August at higher elevations. By netting a portion of the tree and col-

lecting the emerging insects in a large test tube at the bottom of the net they are able to monitor the timing of the adult emergence, and they plan to monitor brood emergence next summer. They have recently documented that the parents come out before the brood, said Greta Schen-Langenheim, a forest entomologist working on the project. Schen-Langenheim also said that they took recently emerged parents back to the laboratory in Logan and put the female adults in fresh pine test-logs to see if they are capable of laying eggs without mating again.



Reddish pitch on a lodgepole pine mixes with wood dust (frass) from mountain pine beetles and forms pitch tubes when the tree tries to force attacking beetles out with pitch or resin. Notice also the frass at the tree base.

Are the massive beetle epidemics that have been tearing through the forests of the western United States and Canada parts of a normal ecological cycle or

are they unprecedented? These are perhaps the most common questions asked of Bentz's project.

Even though she has helped to prove that spruce bark beetles have been killing trees in Utah and Montana for at least 8,000 years (see UFN Fall 2007), our records of the severity of outbreaks only goes back 100 years, in that time frame these epidemics are unprecedented.

As the forests around us are undergoing the largest beetle epidemics in recorded history, it is good to know that someone is paying attention to what is going on so we can gain a better understanding of how things work in the woods.

by Darren McAvoy

New Demonstration Forest on Cedar Mountain

Southern Utah University and the Utah Division of Forestry, Fire and State Lands signed an agreement in late August that designates parts of the university's 2,200-acre Mountain Ranch on Cedar Mountain as a "demonstration forest."

SUU President Michael T. Benson and State Forester Richard J. Buehler, director of the Division of Forestry, signed a memo of understanding (MOU) that provides for a 20-year joint venture to use Mountain Ranch forest land for teaching forest and range management techniques and outcomes.

In a signing ceremony at the SUU Mountain Center, Southwest Area Forester Patrick Moore of the Division of Forestry outlined a three-fold mission of the agreement centered on education and resource management. Moore said the demonstration forest will provide a living outdoor laboratory for SUU students and faculty "with exposure to resources that otherwise might not be available."

Meanwhile, the Division of Forestry will be able to teach techniques of forest management that will enhance natural resources, especially wildlife, water quality and quantity, and air quality, he said. Foresters will also work to reverse aspen decline, seek remedies for other adverse forest conditions created

by 150 years of fire suppression, and protect public and private lands through a progressive fuel reduction program, Moore added. "The forest health challenges

we're facing here are not unique. What we learn here can be applied elsewhere in Utah and across the West."

Moore joined Brian Cottam, SUU Associate Director of Government Relations & Regional Services, and other Division of Forestry employees in guiding a tour of the demonstration forest and explaining the goals of the project. Noting that "forests in the U.S. are in the worst

condition they've ever been in," Buehler blamed fire-suppression policies of the past. "Fire kept our forests young and fresh," he said. "However, we can no longer just allow fires to burn and threaten infrastructure, so we need to do other things to manage our forest lands."

The demonstration forest will allow the Division of Forestry, in partnership with the university, to show other property owners what is possible. "It's a collaborative approach to managing our natural resources," he said. Benson called attention to the majestic view of Cedar Breaks National Monument through the picture window of the cabin and said the university is "so incredibly fortunate to have these natural resources"



Patrick Moore, Southwest Area Forester with the Utah Division of Forestry, Fire and State Lands (right), explains the goals for the demonstration forest on Southern Utah University's Mountain Ranch property on Cedar Mountain.

available to students, faculty and staff. The agreement with the state's Division of Forestry will enhance experiential learning for SUU students, Benson said. "It's one thing for our students to listen to a lecture about reforestation in the classroom, but it's quite another for them to walk through the demonstration forest and see reforestation in action," he said. Wes Curtis, Vice President for Government Relations & Regional Services, echoed that sentiment. "The Mountain Ranch will be an outdoor classroom for practicing, showcasing, monitoring and studying progressive and experimental forest and range-management practices," he said.

SUU and the Division of Forestry will collaborate to create and maintain a forest stewardship plan and a community wildfire protection plan that engages and accounts for adjacent property owners. In addition, they will cooperate on forest and range management, while developing outreach and educational programs to take full advantage of the Mountain Ranch property.

They will provide resources and expertise designed to accomplish the management operations and practices outlined in the memo of understanding. They

will also work together to monitor the impact of the forest stewardship and wildfire protection plans on the Mountain Ranch property.



Southern Utah University President Michael T. Benson (right) and Utah State Forester Richard J. Buehler, director of the Division of Forestry, Fire and State Lands, sign the MOU.

According to the MOU, SUU will include the Division of Forestry as a member of the university's Mountain Ranch Resource Advisory Council and will provide access to the Mountain Ranch for division staff.

The university will also provide administrative oversight of the forest stewardship and wildfire protection plans, while serving as the

lead entity for educational and research uses of the demonstration forest.

In addition to serving on the Resource Advisory Council, the Division of Forestry will facilitate and complete planning for the forest stewardship wildfire protection plans, perform and maintain a forest inventory, administer the fieldwork for contracts that meet the intent of the two plans, and develop and implement management practices to be demonstrated at the ranch.

Southern Utah Woody Biomass Field Day

The Southern Utah Woody Biomass Field Day held on October 18, south of Beaver, was a big hit by several measures. Where else could you find 200 people from across the country and China getting together in the field on a day with a chance of rain to talk about biomass utilization? With five large grinders, chippers, several biomass transport vehicles, a firewood processor, bunches of support equipment and tables of sandwiches for lunch, people were enjoying the opportunity to talk to others about biomass utilization.

Attendees watched as powerful equipment shredded and chipped trees that had been previously cut to improve deer winter range, reduce predation by mountain lions, improve forest/woodland health, and reduce dangerous and destructive wildfires on BLM land along the I-15 corridor. Piles of pinyon and juniper, removed from the nearby forests, were reduced to chips and semi-vans were filled before their eyes in a matter of minutes.

The event was organized from conception to implementation in just six weeks by Lance and Michelle Lindbloom of Bloomin Ranch Service with help from the Bureau of Land Management (BLM), the Utah Biomass Resources Group, the Utah Chapter of the Society of American Foresters, and many others. USU Beaver County Extension Agent Mark Nelson was a huge help with the little details.

Equipment was trucked at the manufacturers' own expense from Arizona, Idaho, Nevada, Oregon, Salt Lake City and Wisconsin.



The CBI Magnum Force 6400 demonstrates how quickly it can fill a trailer with chips as participants observe the equipment in action.

Lindbloom, a private contractor operating out of Beaver, Utah, has an active pinyon-juniper harvest going just south of town. He realized that the location of the site along I-15 would make a great place to demonstrate to people what biomass harvesting is all about and show them the state-of-the-art equipment for just such a purpose.

Lindbloom said that his goals for this field day evolved from the original concept, which was to see exactly what these machines could do with this type of product. After talking with many different people with diverse backgrounds, the goals shifted from not only viewing products that could be created, but also to bringing together all segments of the biomass industry to mingle and discuss the machinery they were seeing.

Lindbloom and his wife Michelle saw that their Nev-ershine Hollow Stewardship project would be a good location with good access, multiple landings, many types of land management treatments surrounding it; many positives for a field day location.

One of the things that really encouraged him to pursue the project was meeting a particular gentleman

whose political views are the opposite of his own, yet when it came to the topic of biomass utilization, they were in complete agreement. Lindbloom said he realized when people from different backgrounds and very different political views can come together and agree on an issue, it has a promising future.

As the federal agencies are increasingly using mechanical means to manage forest and woodland vegetation for multiple purposes, including wildfire hazard reduction, especially around communities and infrastructure, there is a corresponding increase in opportunity to create markets for the material being removed. Discussion of market possibilities was an important part

of the day. Some of the end products include firewood and wood pellets, cattle bedding, landscaping mulch, and fuel for 1 to 1.3 Megawatt Electric Power Plants that each can serve about 800 typical homes.

Area Forester Patrick Moore said that while many companies brought their biggest and best, some brought their more affordable models for people to see.

Lindbloom said that he received a tremendous amount of support from companies and individuals and is planning the Second Annual Southern Utah Woody Bio-

mass Field Day for 2011.



Lance Lindbloom, owner of Bloomin Ranch Services, and organizer of the Southern Utah Woody Biomass Field Day.

For more information regarding any of the information presented in this newsletter, please call Darren McAvoy at Utah State University, 435-797-0560, write to him at 5230 Old Main Hill, Logan, UT 84322-5230, or email darren.mcavoy@usu.edu.

To get on our list for email delivery of this newsletter go to <http://extension.usu.edu/forestry/subscribe.html>. For back issues visit <http://extension.usu.edu/forestry/reading/ufnindex.htm>

The Utah State University Forestry Extension website, found at <http://extension.usu.edu/forestry>, is an excellent source of technical forestry information for woodland owners. Check the "What's New" section periodically for new postings.

State of Utah Division of Forestry, Fire and State Lands (DFF&SL) service foresters for your area can be contacted by calling 801-538-5555.

Ideas and written contributions to this newsletter are encouraged. Send your contributions or comments to the return address above or call 435-797-0560, or email darren.mcavoy@usu.edu.



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COMING EVENTS

Small Log Conference, Coeur d'Alene, ID, March 23-25, 2011.

32nd Annual Forest Vegetation Management Conference - Forests and Fire, January 12 & 13, 2011, Redding, CA.

Selkirk Society of American Foresters Chapter meeting: Calculating Carbon Credits for a Stand or Parcel, April 14, 2011, Worely, ID.



Aspen changing color this fall in Big Cottonwood Canyon, Utah.