

# Utah Forest News

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## Champion Tree Climber Ascends Champion Engelmann Spruce

Utah Champion Tree Climber Mark Malmstrom just can't resist a challenge, especially when it comes to climbing big trees. Malmstrom is a certified arborist and owner of Total Tree Care in Providence, Utah. When Malmstrom heard that the tallest tree on the Utah Big Tree Register was a 152 foot tall Engelmann spruce near Tony Grove Lake, he knew he had to try to climb to its highest branches.

All 50 states maintain a Big Tree Register in addition to the National Register of Big Trees. The national register began in 1940 as an effort to save the giant trees left standing in virgin forests, according to American Forests, which hosts the program. The Utah Big Tree Register is administered by the Utah Division of Forestry, Fire and State Lands. Meridith Perkins oversees the program and is the Division's Urban and Community Forestry Coordinator.

The Big Tree Program prescribes a point system and measurement guidelines for Big Trees. Anybody can find and nominate a tree for the register, and it

often becomes a light-hearted competition among forestry enthusiasts to find, measure and nominate the dendritic giants. The point system allows for one point for each foot of total height, one point for each inch in circumference at breast height and one quarter

point for each foot of average crown spread. This system appears to be created to consider the size of conifer trees common in the west and broad-leaved trees more common in the East.

Utah has 157 trees on its register; nine of those trees are also national champions, including the country's largest blue spruce, which is listed as 129 feet tall with a 192 inch circumference and a crown spread of 39 feet.

This champion tree is on the Ashley National Forest and was nominated by now-retired State Forester



*Certified arborist and champion tree climber Mark Malmstrom inches up the trunk of a tree.*

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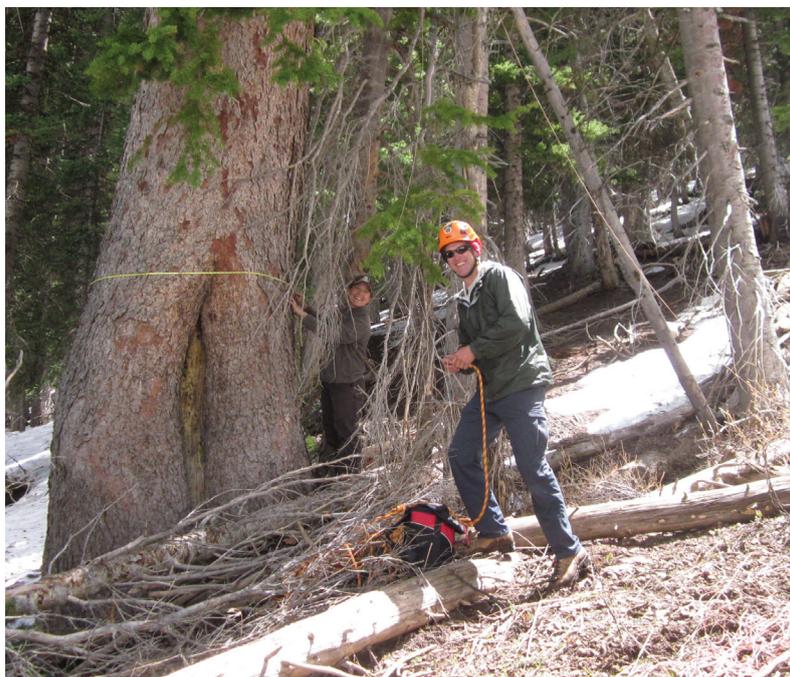
Joel Frandsen and ecologist Sherel Goodrich. Do you know of a bigger one?

The state champion Engelmann spruce Mark Malmstrom was determined to climb is listed as 152 feet tall with a circumference of 204 inches and an average crown spread of 20 feet. The tree is located on the Logan Ranger District of the Uinta-Wasatch-Cache National Forest. It was nominated by me and Toby Weed, a forecaster for the Utah Avalanche Center in Logan.

Malmstrom was the 2012 Utah Champion Tree Climber. He was also the state champ in 2006 and 2007 and recently represented Utah at the International Tree Climbing World Championships in Portland, Oregon. According to Malmstrom, it is not an easy crown to hold onto. He said there are many different variables that can put him at the top of the list for the day, or not; you have to be on your game that day to win. It is easy to lose points for small mistakes, and many are disqualified because they cannot meet the time requirements. The competition is much more than just getting to the top of a tree quickly. It includes five different common work-related scenarios that a professional arborist might face on a daily basis. These include the Work Climb, Aerial Rescue, Belayed Speed Climb, Secured Foot Lock, and Throw Line tasks.

When I first met Malmstrom several years ago, he was actually climbing in a tree in my neighbor's yard—a yard that happens to have four state champions including the biggest sugar maple, purple leaf beech, yellow poplar tuliptree, and katsuratree. I happen to

live in the same town as Malmstrom, and one morning last year, he waved me down on my way to work to ask me about the state champion Engelmann spruce and expressed his desire to climb it. It took a while for our schedules to match up, but we finally got it done.



*State Urban Forestry Coordinator Meridith Perkins (left) measures the girth of the state champion Engelmann spruce as Mark Malmstrom (right) readies his climbing gear.*

The big spruce is less than a half mile from the parking lot at Tony Grove Lake, 33 miles up Logan Canyon, but on this day in late May, there was still a few feet of snow on the ground

leading up to the tree. Despite the warm temperatures in the valley that day, it was still cool and breezy in the mountains above 8,000 feet, especially while we were on the snowpack. It was mostly supportable, but we were breaking through the snow surface in a few places, 'post-holing' in snow up to our knees, yet undeterred. We were joined by the Big Tree program coordinator Meridith Perkins and urban forestry intern Heather Church.

Malmstrom's respect for the tree and his awareness of safety protocol was obvious. Not using spikes, the key is to ascend ropes to get to the lower branches, then mostly hand climbing the branches up the trunk

from there. Of course getting the rope into the tree in a secure location was no easy task, although he made quick work of it. The climbing process started with a small weight, a brightly colored six pound bean-bag with a grommet built into it and a heavy string. Malmstrom deftly slung it up over some of the more secure lower branches, aiming for a spot close to the trunk of the tree for better strength and stability. Then he attached a climbing rope to the string, using the string to pull the rope up to a secure anchor point in the tree.

He then used the rope to climb the tree by putting his feet against the wide trunk and using what is called the hip-thrust technique. This maneuver is like the opposite of rappelling where the climber pushes his hips up, thus unweighting the rope for just a few inches and simultaneously pulling down on the other end of the rope. In this way he slowly inches his way up the tree. If it were me doing it, it would be slow progress, but Malmstrom was high up into the lower branches of the tree in just a few seconds.

There wasn't much we could do now but watch and get out of the way. He was occasionally knocking dead branches off of the tree to clear a way for his travel, and they would fall to the ground with a thud, embedding deeply into the snow pack after traveling down for more than a hundred feet. This is when

Malmstrom pointed out that in his profession, it is the folks on the ground that are much more likely to get hurt than the folks up in the canopy, on account of falling material and the danger of feeding the chipping machine.



*His orange helmet barely visible, Malmstrom perches at the top of the champion spruce. The tree is listed on the state Big Tree Register as 152 feet tall.*

Spruces are notoriously difficult to climb because the branches tend to droop down as they come out of the trunk, so the footholds and hand-holds are not so great. Also their prickly needles make them uncomfortable against the skin. Despite the challenges, about 15 minutes later we could hear Malmstrom calling from the top. From a hundred feet away we could see that there was a fork near the top of the tree, which can signal a weak spot, Malmstrom continued to climb even higher until we could see his orange helmet among the highest branches and cones 150 feet above the snow. Soon

afterwards he was back on the ground where he gave some impromptu lessons on tree climbing.

It gave me the willies just looking at him up there, especially being in the woods and away from medical care or rescue assistance, but at the same time it was pretty cool to see a champion climber in the very top of the champion spruce.

*by Darren McAvoy*

**Utah Big Tree Registry:** [www.utahurbanforest.org/amazing-trees/big-tree-directory](http://www.utahurbanforest.org/amazing-trees/big-tree-directory)

## Woody Biomass Industry in Utah: the Story of the UBRG

*Editor's note: this story was originally published in Rural Connections, a publication of the Western Rural Development Center.*

The Utah Biomass Resources Group (UBRG) has a mission to facilitate the development of a woody biomass industry in Utah and to promote public biomass education and outreach. Part of that mission is being accomplished with music. The UBRG hosted Utah's first-ever wood fired concert in September of 2012 under the pavilion on Main Street in Beaver, Utah. The Dragon Wagon, Utah State University's mobile gasification demonstration unit, supplied power for the concert. The Muddy Boots Band played country rock for 150 people while USU Extension Agent Mark Nelson cooked burgers for the crowd. This was part of the third annual Southern Utah Biomass field days, co-hosted by Southern Utah Biomass, USU Beaver County Extension and the UBRG.

The Dragon Wagon is a former Air Force delivery van that was retrofitted to haul a gasification reactor and electric generator. This unit is designed to demonstrate how woody biomass can be converted directly into electricity. The project is funded by a USDA Forest Service "Fuels for Schools" grant that was awarded to the UBRG by the Utah Department of Agriculture and Food.

In gasification, a controlled amount of oxygen reacts with the biomass at a high temperature, 800 degrees C. When the wood is cooked in this fashion, gasses are released and captured. Under these controlled conditions, there are very few emissions from the process. The gasses produced from the wood chips are piped into a standard propane generator that

produces electricity. This system makes about 8 kilowatts of power, approximately enough for one or two homes, or one loud country rock band.

### UBRG Goals, Partnerships, and Strategies

The UBRG's goals include seeing woody biomass markets established and available to Utah landowners and land

managers in Utah while improving the economy of forest management activities. This will allow more acres to be restored to a more resilient form while adding jobs and value to rural economies. The UBRG is taking a variety of approaches toward meeting those goals including the development of gasification and pyrolysis technologies, promotion of biochemical and conventional products, and the advancement of cofiring and educational opportunities. Led by Utah State University Extension, the project partners include the Bureau of Land Management, the USDA Forest Service, the Utah Department of Agriculture and Food, Amaron Energy, the Utah Division of Forestry, Fire and State Lands, the Utah Office of Energy Development, and others.



Photo by Dennis Hinkamp

*Pinyon-Juniper chips ready for gasification.*

Part of the UBRG's strategy is to initially focus efforts on Pinyon-Juniper (PJ) woodlands and branch out to include upland forests and other biomass feedstocks. PJ is plentiful and available and currently has limited commercial value. PJ covers some 100 million acres in the Western U.S. (Romme et al., 2008), and in many cases this resource is in need of thinning. PJ covers ten times the number of acres that it did at the time of European settlement in America (Miller and Tausch, 2002), due to a combination of fire suppression, grazing, and favorable weather patterns. This is referred to as PJ expansion. An additional concern is PJ densification, in which the trees fill in until there is no open space between them, the woodland growing thicker and more impenetrable all the time. This density is expected to triple in the coming decades (Tausch, 1999). The result is a less diverse and less resilient landscape that offers little in the way of biodiversity or forage but offers significant potential for a wildland fire catastrophe.



*Pinyon-Juniper woodlands are a plentiful biomass feedstock.*

The BLM is treating 40,000 acres of PJ annually in Utah, but the pace of restoration is limited by money. If the PJ resource had value, it could finance the cost of restoration activities, allowing land managers to treat more acres. This effort will require a tremendous amount of labor, creating jobs in the process. The result can be a Great Basin landscape that is more resistant to weeds and wildfires and communities that are more resilient to economic fluctuations.

### **Applying Available Technologies to the Biomass Challenge**

Perhaps the biggest challenge of working with

woody biomass is its high air and water content. A truckload of wood, even when chipped, is mostly air and water. This severely limits the distance it can be economically trucked. The challenge, therefore, is to densify the product before hauling it out of the woods as a valuable product. Mobile pyrolysis may be one of the keys to densification.

The UBRG is partners in a mobile pyrolysis unit: a self-contained trailer that converts woody debris into densified biomass. Pyrolysis cooks the wood in the absence of oxygen at lower temperatures than gasification to produce three products: producer gas, biochar, and bio-oil. The producer gas is used to keep the process going,

sustaining its own system once up and running. Biochar is sometimes defined as charcoal engineered for agriculture and it carries a high value as a soil amendment and offers soil carbon storage potential. Bio oils can be used in traditional fuel oil heating applications and can be converted into biochemical products and fuel.

The UBRG has also contracted with two Utah entities to assess the potential of mixing wood with coal, known as cofiring, in Utah power plants. This included a series of cofiring tests and an exhaustive review of the scientific literature on the topic.

The bottom line of the potential for cofiring at Utah power plants is that it can be done physically, and PJ is a good feedstock for the purpose, but in Utah there are no economic incentives such as tax credits, nor are there regulations to encourage power production from renewable sources, as exist in some other states. Adding wood to the coal presents a wide variety of

potential pitfalls, and the utility operators have little incentive to do so under current conditions.

Another path the UBRG is pursuing includes making high-value biochemical products, such as plastics and adhesives, from woody biomass.

UBRG member Dr. Foster Agblevor, USTAR Endowed Professor at Utah State University, has been making plastic from wood biomass bio oils for months now and says that PJ is ‘Good stuff’ for making plastics.

If making plastic from wood seems like a distant goal for the UBRG, take heart in the fact that it is simultaneously promoting more conventional woody biomass products such as firewood harvesting, post and pole manufacturing, animal bed shavings, and more.

### Education

From wood-fired concerts to presenting at a variety of scientific conferences, the UBRG is helping to spread the word about biomass utilization in Utah. The UBRG has co-hosted annual field days and biomass summits, published a variety of articles in the Utah Forest News and other publications, presented on radio and TV and hosts the website [utahbiomassresources.org](http://utahbiomassresources.org). In 2011, the UBRG co-hosted the Restoring the West Conference. The conference title neatly sums up the UBRG’s goals and plans for promoting biomass utilization in Utah: “Sustaining Forests, Woodlands, and Communities through Biomass Use” (see [restoringthewest.org](http://restoringthewest.org)).

### Comparisons Between Technologies and Renewables

It has been our experience that gasification of wood in the field is possible but challenging. We set out with the Dragon Wagon project to demonstrate

that a farmer or rancher could use this technology to create mobile, remote, economical power. We are learning however, that it requires a full time person with a wide complement of technical skills to produce consistent power. This requirement negates

the economic and practical advantages of producing electricity with wood in this manner. Cofiring on one hand makes a lot of sense, especially considering the vast sums of material that could be utilized. However, it adds considerable complication to a coal based

system and without external pressures to use wood, such as incentives or regulations, cofiring is unlikely to happen.

We are focusing our attention on mobile pyrolysis and its ability to produce a marketable, densified biomass product in the field, such as biochar. A fleet of self-contained mobile pyrolysis trailers could largely replace the need for open burning in the forestry and agricultural sectors. This level of biomass utilization can provide other societal benefits such as offsetting the costs of wildland fire hazard reduction projects, removing nuisance smoke from the air, and improving wildlife habitat.

Even with these advantages perhaps the greatest argument for utilizing woody biomass becomes more apparent after comparing it to other energy feedstocks. Woody biomass is not a fossil fuel and it is not food. It is one of the few renewables that offers the potential to produce power regardless of whether the wind is blowing or if the sun is shining. Given the energy challenges we face as a nation it makes sense to use this waste product to produce needed energy commodities such as bio oils and soil amendment products such as biochar. Woody biomass is stored solar energy – local, organic, and secure.

*by Darren McAvoy*



## Restoring the West Conference 2013

Change Agents and Managing for Forest Resilience

October 16-17, 2013, Utah State University, [www.restoringthewest.org](http://www.restoringthewest.org)



Management of forests in the West is occurring in the face of changing climate and shifting disturbance factors like bark beetles and fire. In some locations, aspen stands are declining and bark beetles are causing large-scale conifer mortality. The 2013 Restoring the West Conference will bring scientists, landowners, and managers together to focus on using science and policy to manage for increased forest resilience as we confront a variety of change agents. There will be two days of plenary

sessions and a poster session. Poster submissions are requested. For more information visit our website at [www.restoringthewest.org](http://www.restoringthewest.org).

This conference is organized and sponsored by Utah State University (Cooperative Extension, Wildland Resources Department, College of Natural Resources, and Ecology Center), USDA Forest Service – State and Private Forestry, the Western Aspen Alliance, and others.

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](mailto:darren.mcavoy@usu.edu).

To get on our list for email delivery of this newsletter go to <http://forestry.usu.edu> and click on Join Our Mailing Lists. For back issues visit <http://forestry.usu.edu> and click on Publications and Utah Forest News.

The Utah State University Forestry Extension website, found at <http://forestry.usu.edu>, is an excellent source of technical forestry information for woodland owners.

State of Utah Division of Forestry, Fire & State Lands 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](mailto:darren.mcavoy@usu.edu).

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COOPERATIVE EXTENSION

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## Utah Forest News

### COMING EVENTS

**12th Annual Timber Harvest Tour:** September 5, location to be determined. For more information, contact Darren McAvoy at [darren.mcavoy@usu.edu](mailto:darren.mcavoy@usu.edu).

**Restoring the West Conference -- Change Agents and Forest Resilience:** October 16 & 17, Utah State University, Logan, Utah. See [www.restoringthewest.org](http://www.restoringthewest.org) to register.

**Society of American Foresters National Convention:** October 23-27, North Charleston, South Carolina. Visit [www.safnet.org/calendar/](http://www.safnet.org/calendar/) for more information.



*Perched in the top of the largest Engelmann spruce in Utah, certified arborist Mark Malmstrom proved his climbing prowess. See Darren McAvoy's article on page one for the full story.*