

# Utah Forest News

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## 2019 Update: Juniper Mortality in Southeastern Utah

In mid-2018, reports began to surface that juniper trees were dying in large numbers across southeastern Utah. Characterized by a pronounced yellowing of their needles, this colorful phenomenon proved to be quite a mystery. Why were juniper trees, a notoriously hardy species, suddenly dying?

Perhaps most vocal about this disturbance is Dr. Kay Shumway, a retired professor who began to notice the yellowing junipers in May of 2018. An avid nature photographer, Shumway collected drone footage of the die-off

*Researchers gain insight into the phenomenon causing widespread juniper decline in southeastern Utah.*



Group discussion of soil conditions after digging a shallow soil pit near one of the sampled junipers. Photo by Liz Hebertson.

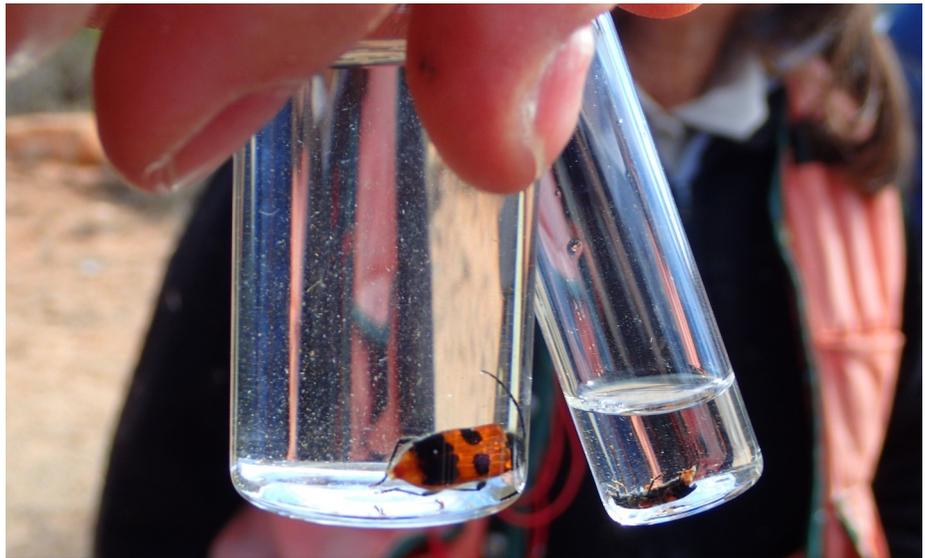
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within San Juan County and posted it on social media. Alarmed by what he was seeing, Shumway also contacted land agencies across the region with first hand reports of the disturbance.

Dana Witwicki, Vegetation Ecologist with the National Park Service, was one such representative who picked up on Shumway's message. Concerned about woodlands within park boundaries and across the state, she requested formal assistance from the Forest Service's Forest Health Protection team. This team of specialists provides technical assistance to other agencies across the region to, "...prevent, suppress and control outbreaks threatening forest resources."



Wood borer adults and larvae found during sampling efforts. Permits were obtained to take samples from trees on public land. Photo by Liz Hebertson.

On November 28, 2018, the Forest Health Protection team took a field trip to assess several affected sites northeast of Blanding and in the Cedar Mesa area. Accompanying them were roughly 20 resource specialists from state and federal land agencies, researchers from Utah State University, media representatives, Shumway, and several members of the public. Under the direction of Liz Hebertson, Lead Forest Health Protection Specialist, this coalition collected tissue samples from affected junipers, soil samples from below the junipers, and insect specimens from affected trees. On-site observations combined with reports from



Liz Hebertson, US Forest Health Protection specialist pointing out insect damage underneath bark of a juniper tree. Photo by Liz Hebertson.



Forest Health Protection team member examining a juniper core for insects or signs of pathogens. Permits were obtained to take samples from trees on public land. Photo by Liz Hebertson.

Management's (BLM) Canyon Country District spokesperson, is cautious against drawing conclusions at this early stage as researchers "...we are still in the initial stages of observation." Before any answers can be reached, soil samples must be analyzed while tissue samples must be tested for diseases. The BLM has also requested aerial imagery of the affected sites to accurately determine the range of the

across the region, paints a picture of this disturbance:

- Current juniper mortality occurs in patches across the region; yet there is no survey of the total area affected.
- Pinyon mortality has also been observed.
- Affected trees are characterized by yellow needles which turn brown and eventually fall off, however lower branches and roots seem less affected.
- All ages seem to be impacted.
- Tree mortality is limited at high elevations and within sparse woodlands at low elevations.
- Not all impacted trees die; there is evidence of regrowth in some affected areas.
- Secondary pests (such as round and flat-headed borers) are present in affected trees.
- Similar disturbances have occurred - notably last year in southwestern Colorado.

The specific cause of this disturbance is difficult to determine. Lisa Bryant, the Bureau of Land

disturbance. The Forest Health Protection team will produce a final report in 2019 that will encompass results and conclusions from the field trip and lab tests. In the meantime, Colleen Keyes, Forest Health Coordinator for the Utah Division of Forestry, Fire and State Lands, expects that drought and secondary insects may be to blame for the disturbance. San Juan County is currently in the midst of a drought and 2018 was the hottest and driest year on record. In the 1980s and early 2000s, the region experienced similar disturbances following extensive dry periods. Certain characteristics of the stressed trees and the fact that multiple species of all ages are affected is further evidence of drought-induced mortality.

If the current disturbance is drought-induced, there may be some hope though, as Bryant explains, "...we're better positioned moisture-wise this year." A wet spring may help stressed woodlands rebound, as evidenced by a similar case in southwestern Colorado last year (<https://the-journal.com/articles/111161>). Despite this, the BLM emphasizes the importance of being firewise during the upcoming season because a wet season can produce a surge of cheatgrass growth which, when coupled with the increase in dead

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trees, may heighten the potential for wildfires.

The Utah Forest News will keep you posted once the official Forest Health Protection report is published and will provide updates on changes in land management or treatment prescriptions.

*-Michael Stapleton, USU Forestry Extension Volunteer*

## Aspen restoration efforts underway in Northern Utah

On December 20, 2018, the Uinta-Wasatch-Cache National Forest (UWC) and the Ashley National Forest in Northern Utah initiated an effort aimed at aspen restoration. Spearheaded by UWC Fire Ecologist Christine Brown, the initial meeting included about 20 participants from the respective National Forests as well as a variety of faculty members from Utah State University's Wildland Resources Department. UWC Forest Supervisor Dave Whittekiend outlined the reasons for wanting to restore aspen across these landscapes listing the need for more young aspen to replace dying stands, the relative fire resistance of aspen stands when compared to conifer forests, and the increased biodiversity of aspen forests. Over the next decade, the public will observe the results of these efforts as more forestry activities are undertaken to encourage the growth of young aspen and protect those young shoots from grazing and browsing animals. All of the available tools will be used, including fire, mechanical treatments, and fencing. The goal is a strong population of trees that survive to grow past the young and fragile years, to when they are reasonable recruits to replace existing, aging stands.

*-Darren McAvoy, USU Extension Assistant Professor*

## USU Researchers feed biochar to sheep

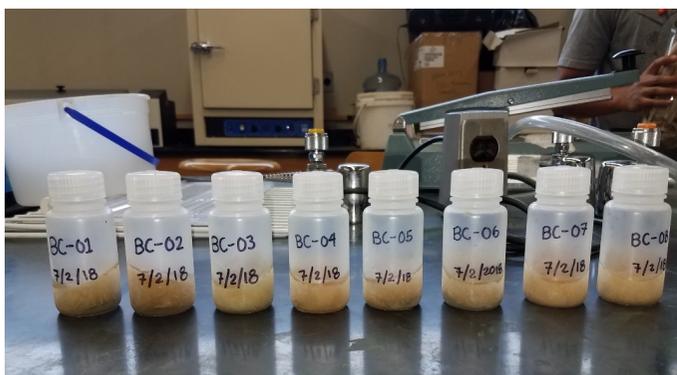
Researchers at USU are feeding biochar to sheep. Through a multidisciplinary partnership with the Utah Biomass Resources Group (UBRG) and Darren McAvoy, USU Wildlands Resources Professor Dr. Juan Villalba started testing the behavioral and physiological response of sheep when their diets are modified to include a small amount of biochar. Biochar is a carbon-rich material, very similar to charcoal. Activated charcoal is used by humans to ease indigestion and in some cases, as an antidote to poisoning (food or otherwise). If patients have overdosed, they may be given charcoal to adsorb the drugs in their gut so the drugs don't enter other parts of their body. Because of its unique properties, many researchers have investigated the impacts of feeding biochar to sheep, with the expectation that that it may enhance the efficiency of nutrient utilization, reduce environmental impacts (by reducing greenhouse gas emissions), and increase the rates of detoxification and elimination of xenobiotics (pesticide residues). These predicted results may improve animal productivity, health and welfare.

What makes biochar unique?

The alkalinity, electric conductivity, and electron buffering capacity are characteristics of biochar particles that make it a unique additive for livestock feeding operations. These features of biochar help animals utilize food more efficiently, and as a result the animal emits less methane (one of the top greenhouse gasses).

In 2018, 24 lambs were entered in this study, with three treatment groups. Group 1 was not fed

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Top: Sheep in holding pens where experiment is being carried out at Green Canyon, Utah. Bottom left: Rumen fluid samples from sheep are tested to determine the volatile fatty acid profile of rumen fluid found in sheep that have consumed biochar vs. a group that did not consume biochar. Bottom right: Sampling blood from the jugular vein to determine blood urea nitrogen. Photos by Juan Villalba.

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biochar, Group 2 was fed their regular diet with 2% biochar mixed in, and Group 3 was given a choice to eat the biochar(less) food, or the food with the biochar. This experiment tested for food selection – did sheep show a preference for food with or without biochar? In addition, Villalba measured the following physiological conditions using the following metrics:

- Daily ration/ intake – this determines if food preferences exist.
- Diet quality – this evaluates multiple factors of daily rations provided (and refused) to measure if ration quality/characteristics impacts their consumption.
- Weight gain and body condition score – baseline information is taken throughout the study.
- Animal feed efficiency – this represents the animal weight gain / kilogram of food consumed.
- Blood collection, blood urea nitrogen content will be analyzed – this determines how hard the animal's kidneys are working.
- Fecal collection, nitrogen and acid detergent lignin will be analyzed – these markers determine the “metabolizable” energy and help evaluate the how digestible the food is for the animal.

Most of the research on biochar ingestion comes from biochars produced in different parts of the world (e.g., Europe, Asia) or from laboratory studies, thus this research aims to fill a large knowledge gap about how locally-produced biochar will impact animal performance. The results of this study are expected in 2019.

*-Megan Dettenmaier, USU Forestry Extension Educator*

## The End of a Reign: The Story of the Former National Champion White Fir

This story begins back in July of 2013. I was a member of the state big tree committee and had the privilege of hiking up Loafer Canyon, near Salem, UT. The purpose of our hike was to measure a large white fir (*Abies concolor*), which BYU arborist, Max Darrington, was familiar with. We hiked a steep trail through extremely lush undergrowth. Thimbleberry and baneberry shrubs were loaded with dazzling pink and red fruit, and myriads of butterflies hovered in the humid air. As I gazed up at the towering white firs around us, I wondered, with anticipation, how much larger a white fir could actually grow. As we emerged into a small clearing, the answer was soaring above me, and above the rest of the forest for that matter. The most striking aspect of this white fir was its hulking trunk and massive limbs. The surrounding firs looked like saplings compared to this giant. The trunk was over 20 feet in circumference and the tree topped out at 101 feet, with a 56 foot spread. We quickly realized that this was not only the largest white fir in the state of Utah; it was the largest white fir in the entire United States. Subsequently, it became the new national champion.

This magnificent white fir reigned as national champion until September 6, 2018 when a small fire in the Uinta National Forest, in Juab County, quickly became a blaze. Designated as the Pole Creek Fire, this mixed severity burn moved into Utah County and impacted 101,875 acres. On September 14, I received news that the fire had reached Loafer Canyon and possibly damaged the national champion white fir. To my dismay, this

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Utah State Champion, White Fir in 2013.  
Photo by Jeran Farley.



Same tree in 2018, following the Pole Creek Fire.  
Photo by Jeran Farley.

report was later confirmed by Darrington, who had hiked up to the tree shortly after the fire was out.

On November 19, 2018, three days before Thanksgiving, I assembled a group, led by Darrington, and we hiked up to the tree. As we drove up the canyon, we discovered that snow had already fallen in the high elevations. As we ascended the steep and icy trail, we quickly entered the area destroyed by wildfire. This was not the forest I remembered. All that remained of the towering fir trees were stark black poles, stabbing the crisp blue sky. No longer surrounded by thick undergrowth, we could now see the contours of the surrounding hills, appearing like an alien landscape. As we scaled the last slope, my eyes met a depressing sight. A charred husk was all that remained of the once grand old champion fir tree. The bulk of its towering crown had already crashed to the ground in a shattered black heap. It thrust its remaining gnarled limbs skywards, as if submitting to its fate. I admired the tree, which, although dead, was still an impressive sight. Next to the massive trunk, smoke wafted out of a large

branch that lay on the ground. I put my hand into the cavity and felt soft ash that was warm to the touch. I realized that parts of this tree must still be smoldering inside, two months after it was destroyed by fire.

Hiking back down the mountain, as I tried to refrain from sliding on the slippery black ash under the thin crust of snow, I reflected on the events that transpired in this forest. This tree was immensely larger than any other tree in this forest. It must have avoided countless wildfires and other destructive events in its past to attain this unique size. Wildfires are a natural function in a healthy forest, yet, they can also cause terrible destruction. We usually focus on our manmade structures that are destroyed in wildfire, which is certainly tragic. Yet, there are natural marvels that are also destroyed, many of which we may not even be aware of. A question surfaced in my mind: "Was there anything we could have done to protect this centuries-old tree from its fiery demise?"

*-Jeran Farley – Urban & Community Forestry Coordinator, State of Utah*

## Utah forms New Prescribed Fire Council

The Utah Prescribed Fire Council was officially created on February 20th, 2019 at a meeting of the advisory committee. The mission of the Utah Prescribed Fire Council is to serve as a forum for prescribed fire practitioners at all levels of government, academic institutions, tribes, coalitions, and interested individuals. This Council will work collaboratively to promote, protect, conserve, and expand the responsible use of fire across Utah's landscape to meet both private and public land management objectives. The council shall be open to all tribes; federal, state, county, and local agencies; private entities, organizations, and companies; private landowners and land managers; and other interested individuals in the state of Utah. Interested organizations and individuals may participate in the Council through attendance at open meetings, involvement in working groups and sub-committees, and participation in other Council activities.

*-Jennifer Hansen, Wildfire Risk Reduction Coordinator, Utah Division of Forestry, Fire, and State Lands, [jenniferhansen@utah.gov](mailto:jenniferhansen@utah.gov)*

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Do you have a story idea for the next edition of Utah Forest News? Have feedback about any story in this issue? Get in touch with us.

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