

Utah Forest News

Utah Forest Landowner
Education Program Newsletter

UtahState
UNIVERSITY

COOPERATIVE
extension

Volume 12 Number 1

Winter 2008

World's Oldest Ponderosa Pine Found in Utah Fire Study

"1765...1772...1777...1780...1782." Stan Kitchen recites from memory a partial list of drought years as indicated by the narrowness of growth rings that form each year on trees. Kitchen is a research botanist for the USDA Forest Service, Rocky Mountain Research Station, at the Shrub Sciences Laboratory in Provo, where he studies the link between fire and climate. By examining the record of fires and drought recorded in the rings of more than 800 trees in the Wah Wah Mountains, west of Milford, he has become intimately familiar with the history of the last several centuries of drought and fire for this remote and rugged location.

Kitchen uses a chain saw to remove a wedge of wood from near the base of selected trees, leaving the tree circumference about 80 percent intact so it continues to live. Samples are also taken from stumps, logs and snags. He brings these samples back to his lab for sanding and processing so the annual rings can be easily identified. One of the trees he sampled in 2003 turned out to be the oldest known living

ponderosa pine in the world. Kitchen took a sample from this tree at about 12 inches above the ground.

The inner-most ring of the sample dates to the year 1075, making this tree at least 933 years old. But it probably took an additional 10 to 20 years to grow to the height of the sample, making the tree perhaps 950 years old.

To obtain ring data the samples are prepared and closely examined. The lighter colored wood in the rings is called "early wood" because it forms early in the season, and the darker strips are called "late wood" because they form later in the season. Each year a tree grows a strip of early and late wood, equaling one growth ring. Counting these rings reveals the tree's age. However, during

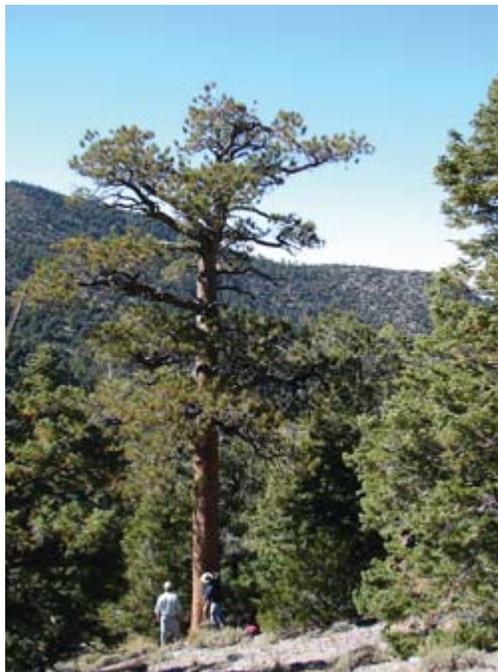


Photo: Doug Page

Stan Kitchen and Forester Clint Reese measure the world's oldest ponderosa pine in the Wah Wah Mountains.

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drought years there are often “missing rings.” Under his microscope, Kitchen can see rings that are just one cell wide. So even when the tree fails to grow an obvious ring, he can often follow the ring around the sample to find a place where it separates, showing that there was indeed a year recorded there. By correlating the dry years between samples, he builds what is called a Master Chronology. This technique is used to date all wood over time in a particular watershed.

Ponderosa pine has a broad natural range that includes much of the western United States and parts of southern British Columbia and northern Mexico. It is said to be the most important pine in the Rocky Mountains for wood products. I mentioned to Kitchen that I found it surprising that the oldest ponderosa in the world would be located on a dry rocky slope in western Utah. I visited the largest ponderosa pine tree in the world near Mt. Adams in Washington State a few years ago, so I would have guessed that the oldest ponderosa would come from a similar site. But Kitchen pointed out that the oldest trees of any particular species are typically located on marginal growing sites, not the more productive sites that yield the largest of a species. Perhaps the largest trees grow fast and die young.

Although there is no “official record” of the oldest

trees in the world, the accepted record keeper, according to Kitchen, is Rocky Mountain Tree Ring Research, a non-profit research organization in Fort Collins, Colorado. The Old Tree List is available on their Web site at <http://www.rmtrr.org/oldlist.htm>.



Stan Kitchen uses a special microscope to study tree rings in a sample taken from the world's oldest known ponderosa pine at the Shrub Sciences Laboratory in Provo.

The list focuses mainly on North America, and reading it held some surprises for me. Compared to other tree species, Kitchen's ponderosa pine only made the “youngster” category, being less than 1,000 years old. The list begins with 4,000 plus-year-old bristlecone pines from Nevada and California, includes several 3,000 to 4,000-year-old sequoias in California, a handful of 2,000 to 3,000-year-old trees, mostly in California, and more than two dozen trees in the 1,000-year-old plus

category from around the West and other parts of the world. Utah has three other trees on the list including two pinyons at 1,101 and 973 years old and a Douglas-fir at 843 years old. Not on the list is an aspen that Dr. John Shaw aged at over 300 years near Bear Lake; very possibly the oldest of its kind.

The annual rings in a tree sometimes record the fires that burn at the base of the tree without killing it, although not all fires may be recorded on an individual tree. The fire must be hot enough or of long enough duration to scar the tree. Ponderosa pine typically has



This core sample shows the annual rings, with date marks added, from another ancient ponderosa pine.

thick bark and can survive a fire that burns at its base. The sample from Kitchen's oldest ponderosa recorded just two fires in this part of Lawson Canyon during the almost 1,000 years of the tree's existence. I found it surprising that both of the fires occurred in the same century, the 1500s. According to Kitchen, other trees in the watershed recorded as many as 10 fires. Conversely, a sample taken from an old ponderosa pine stump in Rose Spring Canyon 20 miles to the south, contained tree ring evidence of 30 fires recorded between 1407 and 1828.

I asked Kitchen to speculate on why there was such a big difference in fire activity within and between drainages. First he explained that no tree should be considered a complete record of the fires experienced in an area. Differences within drainages are often due to differences in factors like aspect, soil depth, and slope. All of these affect the way that fuels accumulate and consequently the behavior of fires when they occur. He also said that differences among drainages could be due in part to the influence of Native Americans who were known to intentionally and perhaps accidentally start many fires in some places. Rose Spring Canyon has a water source, while the nearby Lawson Canyon does not. Therefore, Rose Spring Canyon was more likely to have been inhabited or visited by people and would likely have had

more human-ignited fires over the years. Despite these clues, he said more information is needed before any hard conclusions can be drawn.



Forester Clint Reese measures the oldest known ponderosa pine.

Another interesting thing about the record of the two fires in the 1500s is that the tree grew more in the years immediately following fires, as competition for water and nutrients was curbed by the removal of surrounding trees and shrubs. This is a typical response to fire for surviving trees; similar to a forest thinning response.

This leads to one of the more important findings of Kitchen's study; he says "My research shows that over time the forest structure is changing, especially since the pattern of frequent surface fires ended in the 1800s." In addition to what he sees in the tree rings, he has also noticed the presence of Douglas-fir "skeletons" or snags in these canyons, but few living trees of

that species. He sees a similar pattern in the sagebrush and mountain-mahogany trees on portions of these sites. Skeletons are present, but few living plants. The forest is becoming crowded with pinyon, juniper, and white fir trees. If the current density of trees and shrubs had been present when wildfires ran through these stands, these older ponderosa pine trees would not be alive today. The severe crowning fire that is generally observed in these crowded forests today would have

most certainly been lethal to these old trees.

This part of the Wah Wah Mountain range is public land administered by the USDI Bureau of Land Management (BLM). Kitchen has been cooperating with BLM's Southwest Utah Zone Forester Doug Page on identification of these ancient trees in southwestern Utah. Page is concerned about the future of these ancient pine trees and believes that more active management can help to protect them. The abundant vegetation around the base of the trees can act as ladder fuel in the case of a wildfire, allowing fire to climb

into the canopy and kill the tree. Although this oldest of pines has survived wildfires in the past it may not survive them in the future.

Page said that "by mechanically removing a portion of the competing species from the site, primarily pinyon, juniper and white fir, and thereafter using fire to maintain a more open setting," the BLM could maximize the trees' chances for long-term survival.

by Darren McAvoy

Ponderosa Pine Identification



Leaves: Needles in groups of two and three; 3" to 10" long.

Cones: Each scale armed with a short, sharp spine.

Bark: Dark brown to black on younger trees; older trees have large, thick plates, orange to cinnamon-red, separated by deep furrows; inner bark has a vanilla smell.

General: Native to mountainous areas in southern two-thirds of Utah and throughout the West. Resists fires with thick bark. Drought resistant. Shade intolerant.

Engelmann Spruce Identification



Leaves: Needles borne singly about 1" long; ever-green; blue-green to dark green.

Fruit: a papery cone that hangs down; about 1" long (blue spruce cones are 2.5 to 4" long).

Bark: red to purple brown; made up of thin scales.

General: Approximately 95 percent of Utah's spruce are Engelmann Spruce; blue spruce (Utah's official state tree) makes up about 5 percent of our spruce.

Big Trees

The National Big Tree Register documents the largest tree of each species in the country, and has been maintained by the non-profit organization American Forests since 1940. Utah has its own state Big Tree Register, maintained by Meridith Perkins, Urban Forestry Coordinator for the Utah Division of Forestry, Fire and State Lands.

A friend told me about the Big Tree list for Utah several years ago, and I noticed several state champions in one particular yard in Providence where I live. That beautiful park-like setting certainly influenced my family several years ago as we decided to purchase the property next door. I have been enjoying the shade of the state champion sugar maple and copper beech for years.

While preparing for a recent story on the oldest known ponderosa pine, I spent time with a couple of tree enthusiasts who were carrying on about finding the oldest of this tree species or the largest of that tree species in the cities and the wilds of Utah. They pointed out that Utah holds the national champion blue spruce, Rocky Mountain juniper, limber pine, and others.

Having scanned the list several times, and being familiar with several of the nominators as colleagues and friends (and being a forester), I could not help but

want to successfully nominate a big tree some day.

The nominator for the current Utah state record holder Engelmann spruce also happens to be a friend and colleague who I have done some hiking with in the past. I was jealous that even though he was only in Utah for a few years, he had nominated a successful champion that we had both passed beneath many times before along a popular trail.



Forester Doug Heyrend measures the height of the tallest known tree in Utah.

But there was another Engelmann spruce that I had been passing while recreating on a favorite winter trail and I thought, surely, this must beat all trees of its kind in the state. However, the record holder was a mighty competitor and no easy match. Then came news that that great tree had fallen in a windstorm, and I saw my chance.

The challenge was that the tree lies in a natural avalanche path at the base of some small cliffs near Tony Grove Lake, which at the time was buried under some 80 inches of only

moderately stable snow. In fact, this was the site of an unfortunate avalanche fatality in 1989. I accordingly enlisted the help of a few friends, one a forester and the other an avalanche forecaster, and we used a snowmobile and skis to get to our quarry.

continued on next page

At the tree we had to dig down to find the ground level, then measure up 4.5 feet, the DBH (Diameter at Breast Height) point for the tree. Because it was on a steep slope, we had to do this on the uphill and the downhill sides and average the two to get the most accurate measurement (This is according to Big Tree measurement instructions.) While doing this we noticed a “cat face” on the side of the tree, denoting long-ago scarred tissue, possibly from a fire. Perhaps in this case however, it was from other trees rubbing the bark off while hurtling by in the many avalanches this tree has seen.



Toby Weed, of the USDA Forest Service Utah Avalanche Forecast Center, and the cat face at the base of the big spruce.

The Big Tree list uses the unusual measurement of trunk circumference at breast height, which in this case is over 15 feet. Using the more common diameter measurement, this tree has a 54-inch DBH. As for height, I was glad to have the eyes of another forester there, in addition to a variety of measuring tools, to verify what my eyes were seeing — the tree was a whopping 152 feet tall!

The next measurement was the crown spread, which is an unusual one to take in western forests as well, and perhaps applies more to deciduous trees than to conifers. This consisted of spreading the tape out between two people while the third stood back to ensure that each was holding the tape under the drip line; the vertical line from the point of the maximum width of the crown, taken at the widest and narrowest spots and then averaged.

There was some suspense after getting the measurements and getting them back to town to see if this was indeed a champion tree. We even began to speculate that it could be the biggest tree in the state, given its considerable girth and height.

The Big Tree point system consists of one point for each foot of height, one point for each inch of trunk circumference, and a quarter of a point for each foot of average crown spread.

The good news was that it was indeed a state champion Engelmann spruce, and in fact, it is the largest and the tallest conifer on the list of Utah Champions. As far as the largest tree in the

state, that honor goes to a cottonwood on the campus of Brigham Young University. However, I spoke with a friend in Cedar City who thinks he knows of a bigger one, and we are going to go measure it one of these days.

If you are interested in seeing the big tree list, or nominating a tree for the list of state champions, see the Utah Community Forest Council Web site at <http://www.utahurbanforest.org/big-tree.html>. For additional information on big trees, contact Meridith Perkins, Urban Forestry Coordinator, Utah Division of Forestry, Fire and State Lands at 801-538-5505 or via email to MeridithPerkins@utah.gov.

by Darren McAvoy

New Urban and Community Forester for Southern Utah

The Utah Division of Forestry, Fire & State Lands announce their new Urban and Community Forester for Southern Utah, Ron Morrow.

Morrow is stationed in Cedar City and is in charge of all the state urban forestry programs for southern Utah. Morrow supplements the existing team of Meredith Perkins, overall Urban Forestry Program Coordinator and Scott Zeidler, Urban Forester for the northern part of the state.

Morrow has a bachelor's degree in forest science and master's degree in botany and plant pathology from Colorado State University. He went into urban forestry in 1976 as the city forester for Colorado Springs, where he created a volunteer tree group promoted urban forestry and Arbor Day celebration events. After 14 years in Colorado, he moved to Pasadena, California, to be closer to his parents and to work as the Pasadena City Forester. In 1993 Morrow switched locations and

worked for the City of Anaheim, California, where he stayed until 1997.



Morrow spent the last ten years as a consulting arborist in southern California working on assignments from Beverly Hills to San Diego. Morrow is an International Society of Arboriculture (ISA) Certified Arborist, American Society of Consulting Arborists Registered Consulting Arborist, and an American Forestry Association Natural Resource Expert.

Morrow plans to get involved with the ISA Utah Chapter and make an impact in urban forestry in southern Utah; "I am passionate about trees and their maintenance" he said. "Cities need to realize the value of their urban forest and ways to make it more valuable and safer!"

Morrow can be contacted by phone at 435-586-4408 or email at ronmorrow@utah.gov.

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.

The Utah State University Forestry Extension Web site, 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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Utah State University is an affirmative action/equal opportunity institution.
This newsletter is partially supported by USDA Forest Service State and Private Forestry.

Utah Forest News

COMING EVENTS

Utah Envirothon: April 25-26, 2008, Moab, UT. The Envirothon is a natural resource competition for high school students. For more information visit <http://www.utahenvirothon.org>.

Seventh Annual Timber Harvest Tour: Summer 2008, Richfield, UT. Details to be announced. Hosted by USU Forestry Extension, the Utah Chapter of the Society of American Foresters, and the Utah Division of Forestry, Fire and State Lands.

Forestry in a Climate of Change: The 2008 Society of American Foresters National Convention: Wildland Urban Interface Conference: November 5-8, Reno, NV. Visit <http://www.safnet.org> for more information.



The "Utah State Champion" Engelmann spruce grows near Tony Grove Lake, on the Logan Ranger District. See story on page 5.