

A publication from the Southwestern Ecological Restoration Institutes Fall 2011

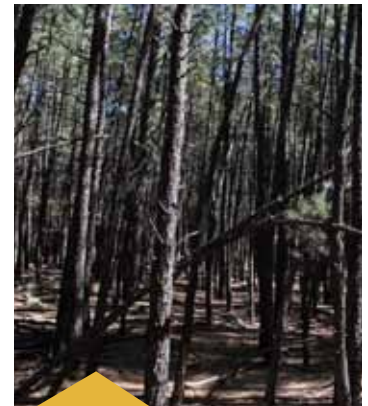
RESTORING THE AMERICAN WEST

Forest Eco-Issues E-Newsletter

REGAIN. REVIVE. RESTORE.



Fire and Floods: Wallow Fire Delivers 1-2 Punch



Crown Fires Contribute to Global Warming...

Uncompahgre Cultivates Tomorrow's Foresters...

Cutting-edge Jobs Supported by Old Wood

Millions of Excess Trees Fuel Catastrophic Wildfires

At the **SOUTHWESTERN ECOLOGICAL RESTORATION INSTITUTES**, researchers and students are working to **REGAIN** natural conditions in degraded ecosystems of the West, **REVIVE** plant and animal communities in widespread decline and **RESTORE** ecological integrity to frequent-fire landscapes. This while we **REGAIN**, **REVIVE** and **RESTORE** the social and economic infrastructure needed to do the forest restoration work.



A flash flood carrying boulders, silt and ash destroyed this Alpine cabin after it survived the Wallow Fire. Burned vegetation on mountainsides can't hold back the water from seasonal monsoon rains.

Wallow Fire Delivers 1-2 Punch

GREER, AZ – Monsoon rains have reduced the fire danger in the high country, but the rumble of thunder is striking terror in the hearts of White Mountains residents as another Arizona crown fire delivers a 1-2 punch.

The homes of Tom Tilford and his Greer neighbors were spared by the half-million acre Wallow Fire, but now they brace for floods. “We used to see the rain as peaceful and healthy for the forest. Now it turns your life upside down.”

Sandbags and large concrete Jersey barriers have become part of the landscape in picturesque towns like Greer and Alpine as home and business owners try to hold back raging flash floods that are flushing boulders, silt and logs down eroding mountainsides.

“The burned soil doesn’t absorb water anymore. It repels water. It’s hydrophobic,” said Greer firefighter Lee Smith.

On Tilford’s property, a trickle of a seasonal stream now can turn into a 45-foot-wide, three-foot-deep river. “When the rain comes your heart pounds and you start making phone calls to make sure you know where your children are. We’re

either in the house or away from the house, but we can’t go back and forth. The driveway is washed out.”

In the backdrop are burned hillsides with charred standing dead trees. “This kind of mortality is completely unnatural,” said Executive Director of the Ecological Restoration Institute at Northern Arizona University Dr. Wally Covington.

“A lot of people focus on the immediate impacts of these large, unnatural fires that we’ve been having and that’s devastating. It’s devastating immediately to wildlife habitat and human habitat. But there’s a secondary impact that people are often unaware of and that is as these watersheds degrade, as the roots break down, as the vegetation disappears that used to hold the watershed intact, we start having major flood events. And it’s not only water that’s being delivered, but massive amounts of sediment that are swept down to the houses below. It’s what my old forest hydrology professor at Yale used to call the 1-2 punch of crown fires.”

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Greer residents and business owners brace for flooding during monsoon rainstorms in the wake of the Wallow Fire that stripped mountainsides of vegetation.



The flooding that continues to damage homes downstream from the burned area in Flagstaff a year after the Schultz Fire illustrates the long-lasting effect of this 1-2 punch. Meantime, in Alpine, Fire Chief Travis Noth examines recent flood damage including the rubble of a home that was destroyed.

“The force of the water moved it off the foundation, tore out the walls and moved rocks into the structure. I expect the worst of the flooding is going to be in the spring when we have snow that sits on the sides of the mountain and we get those warm rain storms.”

Greer resident Tom Tilford sits on a Jersey barrier outside his home, anticipating more flooding from the monsoon season. Barriers and sandbags are part of the picturesque White Mountains landscape now as homes and businesses that survived the Wallow Fire are threatened by flash floods.

Members of the Four Forests Restoration Initiative say millions of small trees that feed uncharacteristically intense forest fires and subsequent flooding need to be thinned out.

“It’s scary having to leave your home,” said Northern Arizona Wood Products Association Executive Director Molly Pitts, an Eagar resident who has evacuated her family during both the 2002 Rodeo-Chediski Fire and the Wallow Fire. “There’s been a lot of research and documentation done on the need to restore our forests, mainly to reduce the density so these catastrophic crown fires don’t happen.” **END**

Crown Fires Contribute to Global Warming even after Flames are Out



NAU forest ecologists Mike Stoddard and Matthew Hurteau are concerned that ponderosa pine forests are not regenerating after unnaturally intense fires that burn through the treetops like the Hochderffer Fire that burned 16,000 acres 15 years ago.

FLAGSTAFF, AZ – Large, unnatural crown fires making headlines are upsetting the carbon balance, both while they are burning and for years to come. This, scientists say, is contributing to global warming.

While we all know trees breathe in carbon dioxide, how long they can hold onto it affects the amount of greenhouse gases in the atmosphere.

Charred logs, standing dead tree trunks and decaying branches mark the site of the 1996 Hochderffer Fire, a crown fire that burned 16,000 acres west of the San Francisco Peaks.

Forest ecologist Mike Stoddard with the Ecological Restoration Institute at Northern Arizona University has been looking for a sign, any sign, of ponderosa pine seedlings 15 years after the fire.

“These large fires are devastating our forests,” said Stoddard. “We’re concerned that ponderosa pine is not regenerating after these wildfire events.”

Scientists also are concerned about the invisible impacts of these fires that burn through the treetops. Forest ecologist Dr. Matthew Hurteau with NAU’s School of Earth Sciences and Environmental Sustainability says there are two types of emissions associated with wildfire.

“Direct emissions happen when fire burns up

the biomass or plant material like pine needles on the trees. Then there are indirect emissions. Over time, the stuff that’s left in the woods, the dead decomposing trees, is emitting carbon dioxide into the atmosphere.”

In research conducted from 2001 to 2007, Hurteau says wildfire emissions in the United States were equivalent to 4 to 6 percent of all our nation’s emissions from burning coal, oil and natural gas. The percentage of lingering indirect emissions is even greater.

“We’re looking to forests to take in carbon, thereby lowering the greenhouse gases. But at a site like the Hochderffer Fire, the grassy vegetation that’s growing in is not making up for the amount of carbon that’s being released from the dead trees.”

Across Highway 180, the story is much the same. NAU School of Forestry professor and tree physiologist Dr. Tom Kolb is calculating the amount of carbon dioxide moving between the land and the air at the site of the Horseshoe Fire. This 8,000-acre crown fire also burned in 1996.

Above the rotting logs, carbon dioxide is flowing through claw-like fingers of a device called an eddy covariance system. Funded by a U.S. Department of Agriculture National Research Initiative grant, Kolb

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is measuring gases being released from deforested and forested sites.

“The fire has had a long-term legacy effect on the capacity of this site to take in and store carbon dioxide. Prior to the fire, this was a dense forest that would take in somewhere between 100 and 200 grams of carbon per square meter per year. Now it’s actually releasing carbon dioxide into the atmosphere at a rate of 50 to 100 grams of carbon per square meter per year. That release is greater than the uptake via photosynthesis by the sparse coverage of grasses and shrubs that came in after the fire. This site has gone from being a carbon sink, where carbon was being stored, to a carbon source, where carbon is being released.”

Burnt remains of intense fires dot Southwestern ponderosa pine forests. Forest Service silviculturist



NAU School of Forestry tree physiologist Dr. Tom Kolb measures the amount of carbon dioxide being released into the air through the claw-like fingers of an eddy covariance system. The site of the 1996 Horseshoe Fire near Flagstaff has gone from absorbing greenhouse gases to releasing them as carbon dioxide into the atmosphere.

David Lawrence walks through the decomposing wood of the Cerro Grande Fire that burned 48,000 acres 11 years ago near Santa Fe, New Mexico.

“The changes have been noticeable and measurable over time regarding the fire length and severity,” said Lawrence. “Since settlement times, with livestock grazing and fire suppression, the forests have gotten much denser and the fire behavior is much different than it used to be. It may be a hundred years, 200 even, before some of these stands are ever forested again. Some of them may undergo a complete type change, becoming brush, in the foreseeable future.”

With carbon making up about half the dry weight of a tree, researchers say overstocked ponderosa pine thickets can store a lot of carbon, at least for a while.

“Storing carbon in lots of little trees in a dense forest is like investing your retirement funds in junk bonds. It’s risky,” said Hurteau. “If we reduce the amount of trees per acre and return ground fire to the system to manage those surface fuels, the carbon left in the live trees is much more stable because it’s less vulnerable to crown fire.”

Carbon flux research south of Flagstaff, where excess small diameter ponderosas have been removed to reflect a more natural forest structure, shows the remaining trees have become more vigorous.

“They photosynthesize at a much greater rate than the trees in the un-thinned situation,” said Kolb. “The thinned forest has an equal to or slighter greater rate of carbon sequestration than an un-thinned forest.”

Scientists say we may all breathe easier in restored ponderosa pine forests that can survive wildfire and continue to take in carbon dioxide. **END**

Uncompahgre Cultivates Tomorrow's Foresters While Shaping Future Forests



Ecological Restoration Institute Executive Director Dr. Wally Covington, Ouray District Ranger Tammy Randall-Parker and Colorado Forest Restoration Institute Director Tony Cheng discuss changes to the forest that have occurred since pioneers arrived and the threats that now put them at risk.

MONTROSE, CO – Sifting through a lush carpet of grasses and forbs and neatly dressed in a Forest Service uniform, Emily Bernier calls out, “We’ve got 20 percent cover of *Pseudostellaria*.”

Guided by Montrose High School science teacher Rusty George, this 17-year-old is participating in the Forest Service Forestry Intern Program. She has spent her summer monitoring the effects of thinning projects on the vegetation of the Uncompahgre Plateau, an overcrowded ponderosa pine and mixed conifer forest in southwestern Colorado.

“Anytime you can place young people in a position where they can see the importance of protecting and restoring the wildlands and taking care of this country’s resources, you shape their thinking process about their future and the future of the world,” said George.

Bernier is attending Colorado State University this fall for a biomedical sciences degree and a minor in conservation biology. Her dream is to become a surgeon, restoring health to sick patients. Similarly, the training she has been receiving in the woods is part of a massive effort aimed at restoring health to the forest.

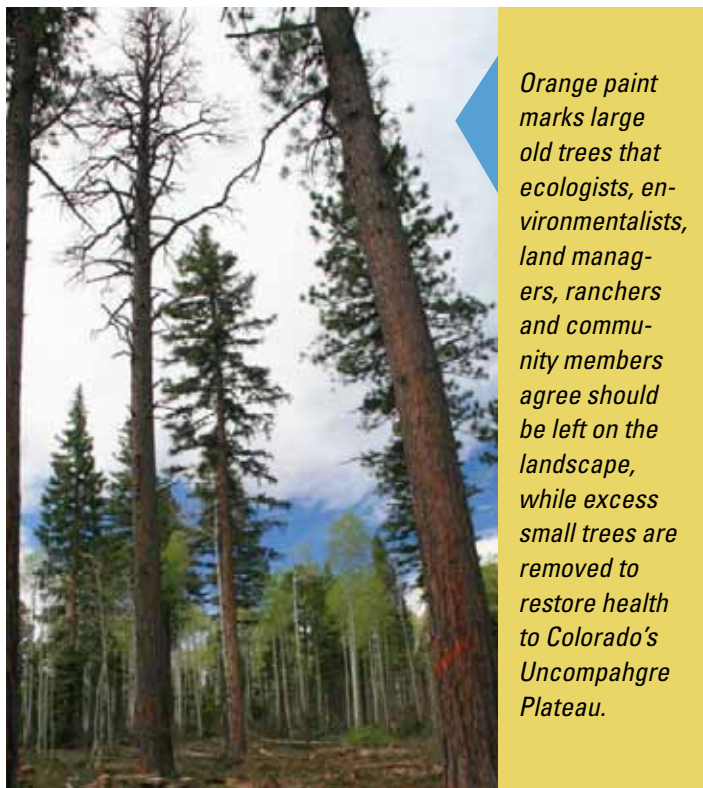
“Whether you are taking care of people or trees, I’m trying to make the world better than what I was born into,” she said.

The Uncompahgre Plateau Collaborative Restoration Project is one of nine landscape-scale treatment efforts nationwide funded by the U.S. Forest Service.

“The Plateau is a million-acre landscape that is threatened by three primary concerns,” said Ouray District Ranger Tammy Randall-Parker. “After a century of excluding fire, we now have a lot of young trees that shouldn’t be here today, competing with each other for nutrients, and creating a crown fire risk. The now weakened older trees have become vulnerable to unprecedented insect infestations. Bugs like bark beetles have moved in and are taking over, killing trees. A third risk is the decline of key forest components like, aspens and meadows, in these dense pine forests.”

“The top problem if you look around is the forest,” said CSU School of Ecosystem Science and Sustainability Professor Dan Binkley. “We’ve lost something that’s not quite the forest. The meadows are an important part of the ecosystem. And with all these trees, a little dry weather and wind will create a fire

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Orange paint marks large old trees that ecologists, environmentalists, land managers, ranchers and community members agree should be left on the landscape, while excess small trees are removed to restore health to Colorado's Uncompahgre Plateau.

situation that will then result in what we don't want, the world's biggest meadow."

With a common vision to restore the Plateau to a more natural ecological condition that can withstand wildfire, drought, climate change and attacks from insects and disease, land managers, environmentalists, wood products industry representatives, scientists, educators and elected officials have come together.

The group met this summer on a 50-acre parcel that had been mechanically thinned and is a part of a 1,000-acre stewardship contract to be worked on throughout the coming year. Other forest restoration projects on the Plateau, about one each year, are planned for the next 10 years.

"Prior to the treatment this was very dense, a condition we would not have seen prior to human settlement," said Tony Cheng, director of the Colorado Forest Restoration Institute at Colorado State University, part of the Southwestern Ecological Restoration Institutes. "A main objective of the project was to open up the forest, favoring the ponderosa

pine and Douglas firs and removing the subalpine fir and other species that had encroached on the area because it hadn't burned for a number of years."

Along with ground fires, also missing from the western landscape in recent years are loggers.

"Through this collaboration we've created a process that has broken the gridlock in resource management," said retired CSU Ecology Professor Bill Romme. "There's been a lot of uncertainty in the supply of timber, so small-time loggers couldn't make a living and we lost the market for the excess trees."

Colorado Wild Director Ryan Bidwell says the treated area may appear harsh for those used to seeing thick forests, but he calls it a necessary step to transition forests from current conditions to a restored state.

"It's a work in progress. We're all operating with the same understanding of what this landscape should look like and could look like, taking action that's driven by what the forest needs and not by economic or political objectives."

Also involved in the collaborative effort is Stu Krebs. He was born and raised in Montrose, spending a good part of his 60+ years in the backcountry.

"When I was 14, the forest was more open. It's oppressive how closed much of the Plateau is these days. This restoration project is really neat. We've been out on our hands and knees trying to pick up evidence of what things were like in 1879. When I walk around this treated area, I'm struck by this gut feeling that it feels like this is the way things should be."

Randall-Parker looks to this ambitious restoration effort with optimism in a race against time.

"We've really got maybe just the next 20 years to abate the fire and insect threat before we lose it all. But I have great confidence in what we can accomplish together." **END**



New Mexico Director of the Southwestern Ecological Restoration Institutes Andrew Egan talks with Alamo Navajo crew members before they head out to thin the forest south of Albuquerque.

Cutting-edge Jobs Supported by Old Wood

ALBUQUERQUE, NM – Hope for forests and communities at risk is spreading like wildfire in an isolated village south of Albuquerque. Ecologists say what’s happening on the Alamo Navajo Reservation could well be a model for forest restoration across the West where there are too many trees and not enough jobs.

In a small lumberyard in Socorro, N.M., young adults are learning how to cut down trees, operate logging equipment and split firewood. Derek Padilla is the crew leader. “This project is helping me because it’s near my home on the reservation.”

The Alamo Navajo Reservation consists of only about 2,000 people. Nearly 70 percent are unemployed and most are living below the national poverty level. Nearby is the Cibola National Forest, unnaturally thick with pinyon and juniper trees. The area is considered New Mexico’s most dangerous place for homes and businesses during fire season.

Finding a demand for the twisted, gnarly trunks and branches of pinyon and juniper trees may be part of the solution for restoring overcrowded, fire-prone forests of the West.



Continued



photo: Kate Dorrell

LEFT: Alamo Navajo crew leader Derek Padilla is making a living while making forests safer.

RIGHT: Anjelita Apachito is the safety officer for the Alamo Navajo Project. From this small lumberyard in Socorro, NM, she and others are carving a wood products niche out of trees that few people wanted.

The Southwestern Ecological Restoration Institutes are providing training along with equipment, such as wood splitters and yarders to develop the workforce.

“We now have people here who are trained in felling, trained in primary processing and trained in restoration monitoring,” said Andrew Egan, director of the New Mexico Forest and Watershed Restoration Institute at New Mexico Highlands University, part of SWERI. “They are really making New Mexico forests healthier and safer places to be because we are reducing the impacts of potential wildfires.”

With SWERI, the Alamo Navajo School Board has created a wood products program out of trees that nobody wanted. “We sell firewood all over the

country,” says the school board’s Natural Resource Specialist Bill Ferranti. “Our biggest market is in west Texas. We shipped some to Chicago. We shipped some to North Carolina. We shipped more than 300 cords last year.”

It’s a collaboration supported by Old Wood, a local flooring business. Owner, David Old, is building a business out of sticks and branches in Las Vegas, NM.

“The whole plant is really scaled and geared for making flooring from smaller trees. We are not about cutting down the big trees.”

If his idea stacks up, Old Wood will construct a new foundation for some 50 employees in a \$2-million-dollar a year operation. **END**

Millions of Excess Trees Fuel Catastrophic Wildfires



Landowner Warren Smith and Ecological Restoration Institute at NAU Executive Director Dr. Wally Covington discuss how to protect the unusual amount of old-growth ponderosa pine trees at Barney Spring south of Flagstaff. This area offers a rare glimpse into the past to understand the forest structure before pioneers arrived and began making changes to the landscape.

FLAGSTAFF, AZ – As ecologists evaluate the damage from Arizona’s largest wildfire, forest ecologist Dr. Wally Covington says millions of small diameter trees that have grown in during the last century have lined up like sticks of firewood ready to fuel unnaturally intense, destructive wildfires like June’s Wallow Fire.

“Decades of scientific research reveal the frequent-fire ecosystems of the West are suffocating under too many trees. Where we once had 10 to 25 trees per acre, we now have hundreds,” said Covington, Regents’ professor of Forest Ecology and executive director of the Ecological Restoration Institute at Northern Arizona University, part of the Southwestern Ecological Restoration Institutes.

The Pumpkin Fire that burned nearly 15,000 acres northwest of Flagstaff in 2000 had as many as 7,000 to 8,000 trees packed in on some of those acres.

“As a result of this unnatural forest structure, the forest cannot self-regulate, ecological processes are out of balance, and the heavy fuel load from too many trees is setting the stage for catastrophic wildfire.”

Covington says we now have extensive overly dense forests across vast landscapes in ponderosa pine, mixed conifer, and pinyon-juniper ecosystems. In the ponderosa pine forests, where fire once burned naturally along the forest floor every three to

12 years – killing excess tree seedlings, recycling nutrients and cleaning up the dead and dying debris – it is now burning through the treetops.

“We’ve crossed a series of thresholds. Starting in the 1940s, we started seeing small crown fires. In the ‘60s, we saw bigger crown fires on a scale of a few thousand acres. By the ‘90s, we started seeing tens of thousands of acres in crown fires. Now, in this century, what we’re set up for are crown fires on a scale of hundreds of thousands of acres. This is clearly not sustainable.”

The 2002 Rodeo-Chediski Fire, Arizona’s second largest wildfire on record, burned nearly half a million acres in the White Mountains.

“If we have disturbances such as wildfires, massive bark beetle infestations and disease outbreaks that are on the scale of hundreds of thousands of acres, then we have to restore landscapes on the scale of hundreds of thousands of acres. That’s exactly where we’re headed with the Four Forests Restoration Initiative in northern Arizona and eight other landscape-scale restoration efforts across the West.”

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The Four Forests Restoration Initiative (4FRI) is the nation's largest forest ecological restoration project, spanning some 2.4 million acres across the Mogollon Rim.

Covington says some 180 million acres of ponderosa pine across the West are at risk, more than 300 million acres with the addition of degraded mixed conifer forests. "Especially with drought and climate change, there is an urgent need to restore forests to their most resilient condition. That requires protecting the old-growth trees and thinning most of the small-diameter trees."

He says the abundance of small trees creates the opportunity for jobs and developing a restoration

economy. "Without wood utilization, the cost of restoration can be as much as \$1,000 per acre. Businesses that can use the excess wood to make products such as oriented strand board, other engineered forest products and energy from biomass will be critical to restoring forest health. NAU has set the goal of using biomass to supply its electrical needs achieving carbon neutrality by the year 2020."

Changes to the forest since pioneers arrived in the late 1800s resulted from heavy grazing that removed grasses from the forest floor, an overabundance of ponderosa pine seedlings that became established in 1919 and the exclusion of natural fire as wildfires were extinguished as fast as possible.

"Fire is to the forest what wolves are to deer. If we remove an essential component of the ecosystem, there is going to be an upset in the balance. Like the deer population explosion that caused deer to far outstrip the carrying capacity of the land after wolves were eliminated, in the absence of frequent, low-intensity fires, the forest has become overloaded with small, sickly trees that are competing with old-growth pines and making our forests vulnerable to crown fire."

Covington says collaborative efforts, such as the 4FRI that aim to accelerate large forest restoration efforts, will make the difference between forests that have become liabilities and forests that are assets.

"Our success in restoring forest health during the next two decades will determine whether we can leave landscape legacies for future generations." **END**



The thick bark of old-growth ponderosa pines used to protect the trees from surface fires that would burn every three to 12 years in the ponderosa pine forest. Ecologist Dr. Wally Covington says these old pines near Greer will likely die in the next few years as victims of the unnaturally intense Wallow Fire.