

REGAINING LOST GROUND

ECOLOGICAL RESTORATION

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NEWS

Restoration on a Grand Scale

For John Paul Roccaforte, the Grand Canyon hike that took him 1,000 feet down and then 1,000 feet up was well worth the energy to find Powell Plateau. "I thought, 'Wow! This is what we've talked about. It's right here!'"

As a research technician in NAU's School of Forestry's Ecological Restoration Lab, Roccaforte knows what characteristics make up presettlement conditions in the Southwestern forests, but knowing what they should look like and finding an example are two different things.

However, in the Grand Canyon, on isolated plateaus such as Powell and Rainbow, there are fairly large forested areas that have not been logged or grazed, and where the natural fire regime appears to have been less impacted by fire suppression.

"We want to use those areas as a baseline," said Roccaforte. "Most ecosystems around Flagstaff are really degraded so it's difficult to find out what they were like. But at Powell and Rainbow, the conditions are just as we had envisioned—a lot of big trees, few trees clumped together with a lot of grass understory."



Currently at the Grand Canyon, researchers with the Ecological Restoration Program, the National Park Service, and the Kaibab National Forest are studying plots on both the North and South Rims in the park and on the Tusayan Ranger District of the National Forest.

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Student Monitors Effect of Dams

Let it flow...

That's what Janelle Clark, senior environmental science major and Ecological Restoration Program undergraduate research assistant, may be saying at the end of this semester.

Clark, working with forestry professor Tom Kolb and Ph.D. student Jonathan Horton, is looking at how dams affect seed mortality in northern Arizona along the Bill Williams River, which is dammed, and the Hassayampa River, which is undammed. She is investigating why cottonwoods and willows, both native tree species, are struggling more than non-native salt cedars to survive.

"Dams change the way water moves through a system," Clark said. "Tree roots stretch down to tap into the water table, but dams only let out a lot of water when the reservoir reaches maximum capacity."



Clark said for cottonwood and willow trees this is detrimental. These species need a more consistent and gradual flow, especially during the spring when, in the past, snowmelt had provided optimal conditions for seed germination. But prescribed floods commonly happen in the summer. And now trees that germinate year-round, such as the salt cedar, can easily survive and, consequently, take over the entire ecosystem.

To better understand this problem, Clark will be spending the next few weeks with a simulated riparian system she built.

continued, see "Student"





Williams Demonstration Project Offers Lighter Touch

In the effort to restore the Southwestern ponderosa pine forests, not everyone agrees on just how it should be done.

Southwest Forest Alliance Executive Director Martos Hoffman said understanding what the forest looked like before European settlement is important, but restoring today's forests to mimic presettlement conditions may be too much too soon and may not be the best way to achieve forest health.

What Hoffman and the SWFA propose is the Natural Processes Restoration Model, a model that includes the removal of trees and prescribed burns, but has a lighter touch on the land than the Presettlement Model.

Presettlement forests in the Flagstaff area averaged about 20 trees per acre. Presettlement restoration projects might thin overcrowded stands to 65 trees per acre, while a Natural Processes Restoration project might leave 85 trees per acre.

A 37-acre parcel of land in the Kaibab National Forest, some seven miles east of Williams, is the Williams Demonstration Project. There, foresters and researchers are implementing the Natural Processes Restoration Model. Thinning was done last summer. Prescribed burning is expected to begin this year.

After the burning rids the forest of the excess fuels—branches, pine needles, and other debris—that have built up on the forest floor with the exclusion of natural fire, Hoffman said the 37 acres should be ready for the return of natural processes that will lead to a healthy, functioning ecosystem.

“Fire is the keystone ecological process in the Southwest's pine forests. We are trying to set the stage for natural fire to return to the forest,” he said.


Some of the objectives driving the project are to protect yellow pines, enhance oak patches and restore canopy structures necessary for such species as the northern goshawk and the Mexican spotted owl.

“We are working to create a diversity of age classes. For example, 5 to 10 percent of the groups of trees we leave wholly intact or apply some very moderate thinning,” said Hoffman.

In addition, SWFA opposes any cutting of trees that are 16 inches in diameter or larger.

The NAU School of Forestry will be doing the research on the project, studying how trees, herbs, and fire behavior are responding to the treatment.

Following work at the demonstration site, the Natural Processes Restoration Model is expected to be applied to a 1,200-acre area in the Kaibab National Forest.



Dwarf Mistletoe

Bob Mathiasen, NAU professor and forest pathologist, is spending a lot of time hanging out under the mistletoe these days. But he won't be getting any kisses.

That's because Mathiasen is studying dwarf mistletoe—a parasitic flowering plant found in ponderosa pine forests—and looking at how it responds to ecological restoration treatments.

"I'm primarily interested in the spread, intensification, and impact of dwarf mistletoe in ecologically restored areas," Mathiasen said.

Dwarf mistletoe is not a newcomer to the forest; it has been around for at least 100,000 years. And witches' broom—dense entanglements of branches caused by the parasite—play an important role in forest ecosystems by providing habitat for forest dwellers such as raccoons and birds.

But the severe infestations of this plant that are found in today's crowded and unhealthy forests are making life difficult for the trees. Dwarf mistletoe feeds on ponderosa pines, greatly decreasing their vigor and stunting their growth. Not only does this open the door for other

infectious diseases and insects such as bark beetles, but also, in the case of heavy infestations, mistletoe may kill its host. Restoration could play a part in alleviating this problem and that is what Mathiasen seeks to find out.

"I'm setting up monitoring plots in the Fort Valley 10K, an area slated for restoration. I will be studying how pine dwarf mistletoe responds to the different



treatments in this area," he said. Mathiasen will be specifically looking at the parasite's reaction to prescribed burning, the rates of intensification and spread in residual trees, and the effects of dwarf mistletoe on future fuel loads.

"I predict that more trees will die from prescribed burning in the severely infested areas," he said. "I

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ECOLOGICAL RESTORATION NEWS Regaining Lost Ground

is a newsletter from NAU's Ecological Restoration Program. The intent of this publication is to share information, discoveries, and successes in the work being done to restore southwestern forests.



Restoration continued

“The Park Service is seeking to return the ecological balance to our forest that includes restoring the natural fire regime and the natural community of plants and animals,” said Bob Winfree, senior scientist for Grand Canyon National Park. “One of the potential benefits of ecological restoration, as it is described by Wally Covington, is that it could enable us to safely restore the fire regime more quickly than prescribed fire or other methods might allow.”

Two years ago, the Bridger Complex Fire swept through the North Kaibab and the park lands, burning more than 53,000 acres. “That worried folks,” said Pete Fulé, research professor for the Ecological Restoration Program. “That fire set the Grand Canyon Restoration Project in motion.”

Since then, researchers have marked four small experimental plots on the North Rim, four on the South Rim, and four on the forest. In each location, one of the plots will receive full restoration treatment. That will include thinning trees to restore the forest’s natural structure, raking branches and pine needles away from old growth, and reintroducing fire.

Another will receive a minimal thinning treatment—just removing the trees around old growth—and prescribed burning. On the third plot

the treatment will be burning only, with debris raked away from old growth trees. And the fourth plot will be used as a control plot. Everything on it will be measured and later compared to the treated plots.

Although the park has never been harvested, grazing began on both rims around 1870. “Sheep and cattle consumed the herbaceous understory and ate up all the fuel,” said Fulé. “As a result, forests in the park have changed to an unnatural condition. Many areas of the park on the South Rim are very dense with small trees. On the North Rim, firs have grown beneath the large ponderosa pines, setting up a fuel ladder and a hazard for crown fires in the old-growth trees.”

So far, the research is primarily concentrated on gathering information and understanding the fire ecology and fire history.

“We are looking at ways to scientifically reconstruct what the ecosystem looked like,” said Winfree. “There are many studies underway to better understand the plant community, the insects, small mammals, and endangered species of the area. We are building this data up from nothing.”

Small experimental plot treatments on the Grand Canyon Restoration Project are expected to begin this summer.

Mistletoe continued

also believe that dwarf mistletoe may act as a fire ladder and that infected branches tend to be more resinous, making them much more flammable.”

In the long run, Mathiasen said he thinks restored areas will show a decrease in dwarf mistletoe infestations.

The Fort Valley 10K area will be thinned

and burned over the next two summers, and Mathiasen said he will closely monitor the parasite’s reaction to the treatments. But he doesn’t expect to finish his research for at least ten years.

“Restoration is not a quick fix for managing dwarf mistletoe,” he said. “It will take a long time before we realize how these parasitic plants respond to the restoration treatments.”



Student continued

"I've made an artificial water table in the laboratory to study natural water table decline and its effects on riparian vegetation," she said.

Clark is re-creating and manipulating hydrological processes with rhizopods, large contraptions made of stout, soil-filled plumbing pipes that are circled around a central "reservoir." Small holes in the bottom of the pipes allow water to flow in from the reservoir.

"I will gather seeds in the field and germinate them, and then transplant them into the tubes," Clark said.

After two weeks of letting the seeds settle in, Clark will then start dropping the water table to mimic what's happening on the dammed river. One rhizopod will serve as a control, and in the other three, she will decrease the table by one, two or four centimeters per day. Clark predicts that the salt cedar will

endure the declines, but the cottonwood and willow trees will die.

"I think native species' germination rates are not successful in dammed ecosystems because they can't grow roots fast enough to keep up with the dropping water table," she said. "And because exotics can survive the declines, they are able to take over."

Clark said her study could have important implications for river management agencies.

"Cottonwood and willow trees provide essential habitat for migrating birds. In fact, 80 percent of native species rely on riparian areas during their life cycle, and these trees are an important component in that," she said.

Clark plans to finish her project this summer and hopes to present her findings at the Society of Ecological Restoration's San Francisco conference in September.

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