



NORTHERN ARIZONA
UNIVERSITY

College of Engineering, Forestry & Natural Sciences

School of Forestry

Carbon Storage in Ponderosa Pine Forests

Several School of Forestry faculty, staff, and students are at the forefront of a worldwide—and increasingly urgent—effort to understand the role of forests in the global carbon cycle. The results of their work will inform efforts to manage forests for continued production of the benefits that have traditionally been important to humans, while at the same time reducing the amount of carbon dioxide in the atmosphere. Carbon dioxide, as most readers of this newsletter already know, is one of the key greenhouse gases scientists believe responsible for global warming.

Professor Tom Kolb is the principal investigator for one of the largest and longest-running, carbon-related studies currently underway in southwestern forests. The work of Dr. Kolb and his colleagues is designed to assess how much carbon is stored or released by ponderosa pine forests and how this process is affected by fuel-reduction thinning and intense wildfires. Key elements of this study include three “carbon flux towers,” each installed in one of three locations: a typical overstocked ponderosa pine stand, a stand that has been subsequently thinned, and a stand that burned intensely in a large wildfire in 1996, which converted the vegetation from thick forest to sparse grassland. The flux towers are loaded with sophisticated instruments to measure the concentrations of carbon dioxide and water in the air above the stands, as well as a host of meteorological variables.

The story emerging from the work of Dr. Kolb and his colleagues is complex, but the “take-home” message is relatively simple. Their work clearly demonstrates that healthy, productive forests can sequester large amounts of carbon, both in the trees and in the soil. On the other hand, forests that are poorly managed and subject to intense wildfires can release large amounts of carbon into the atmosphere, not only when they first burn, but for years afterward. Continues on Page 6.



The carbon flux tower in the thinned treatment.



The array of sensors used to measure carbon dioxide, water vapor, windspeed and other environmental conditions.

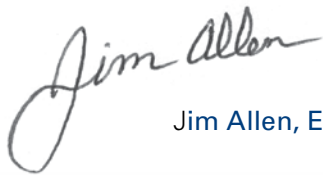
From the Executive Director

Dear Alumni and Friends,

As always, it seems, there is far more going on here in the School of Forestry than can possibly be reported in such a short newsletter. What we have chosen to offer is a mixture that includes stories about our students, faculty, staff, and alumni and their activities—here on campus, out in the forests around Flagstaff, and quite a bit farther afield. I hope you'll agree that the accomplishments of the School of Forestry "family" are quite impressive.

One recent development I'm pleased to report (see page 6) is the creation of a School of Forestry Advisory Council. This 14-member group consists of 10 School of Forestry alumni and four other prominent forestry professionals. It is vitally important to stay in touch with practicing professionals, who can provide invaluable advice on the needs of employers, trends in the profession, and other issues. In addition to the advice and support we are now receiving from the council, we welcome the thoughts and suggestions of all our alumni and friends, as well as employers of our students.

While there will be challenges ahead due to the economic environment in which we are operating, I continue to be very optimistic about the School of Forestry's future. One reason is that the School of Forestry's enrollment is booming. Our undergraduate enrollment, which stands at 216, is larger than it has been at any time since the tail end of the Baby Boom era in the early 1980's. Our graduate program also continues to grow and thrive and, along with it, our research activities. With strong enrollment and the kinds of accomplishments reported in this newsletter, I think the future is bright indeed!



Jim Allen, Executive Director



Paul Beier (left) during a recent visit to Bhutan.

Faculty Rise to Senior Positions in Professional Societies

School of Forestry professors Paul Beier and Carol Chambers have ascended to top leadership positions in major professional societies for scientists and managers working on biodiversity and wildlife conservation issues.

Dr. Beier, a professor of conservation biology, became President-Elect of the Society for Conservation Biology, an international organization with more than 10,000 members, at their international meeting in Beijing, China in July 2009. He will serve two years as President-Elect,

two years as President, and another two years as Past President. Dr. Chambers, a professor of wildlife ecology, was elected to The Wildlife Society's (TWS) Council. TWS is the primary professional organization of wildlife biologists and wildlife managers in North America. It is governed by the Council, which is comprised of four officers and eight section representatives. Dr. Chambers will be serving as the Southwest Section's representative—a section comprised of members from Arizona, New Mexico, western Texas, and Mexico.



Professor Carol Chambers at work capturing bats in Nicaragua.

Student SAF Chapter Wins National Award



Forest Service Chief Tom Tidwell (far left) talking with Forestry Club members.

The Student Chapter of the Society of American Foresters was selected as the Outstanding Student Chapter for the 2008/2009 academic year! The School of Forestry has long had one of the largest and most active student chapters in the nation, but the 2008/2009 year was truly an outstanding one for the chapter, thanks in large part to the great leadership of chapter president for that year, Erin Saunders, and her fellow club officers. Many of the students and the chapter's advisor, Dr. Denver Hospodarsky, accepted this award at the SAF National Convention in Orlando, FL, in October. After receiving their award, the chapter members had the opportunity to speak with the new Chief of the Forest Service, Tom Tidwell.



Dr. Denver Hospodarsky (far left) and Chief Tidwell (seated near center) posing with Forestry Club members at the Society of American Foresters National Convention in Orlando, FL.

Graduate Student Receives Outstanding Presentation Award



Seth Davis, a doctoral student in the School of Forestry, won first place in the student competition for the President's Prize at the Entomological Society of America annual meeting in Indianapolis, Dec. 13-16, 2009. Davis presented his research, "Response of the Western Pine Beetle, *Dendroctonus brevicornis*, to Variation in Host Phytochemistry." Also attending the meeting was Seth's advisor, Dr. Rich Hofstetter, and Kasey Yturalde, a first-year doctoral student who is also working with Dr. Hofstetter.

Seth Davis, Dr. Richard Hofstetter, and Kasey Yturalde (shown from left to right) at the ESA annual meeting.

Professor and Grad Student Collaborate with Alumni for Teak Research



Justin Hallett posing with a large teak leaf in a three year old plantation.

Regents' Professor Michael Wagner and Justin Hallett (MF 2009), spent several days this past summer investigating teak plantations in the vicinity of Jalisco, Mexico. Some of the results of this investigation were included in the professional paper Justin produced as part of the requirements of his MF degree.

In addition to investigating technical issues, such as plantation establishment, post-planting management, and insect and disease occurrence, Wagner and Hallett also looked into the economic viability and possible environmental impacts of the plantations. Their investigations took them to both intensively-managed commercial plantations and smaller plantations established by farmers as a means of supplemental income.

One of the highlights of the pair's trip was the time they were able to spend with two alumni of the School of Forestry. Javier Díaz-Calvo (BSF 1994) is the founding forester and a partner in Proteak, a company that has established more than 7000 acres of teak plantations in Mexico and offers a range of products made from teak. Dr. Jamie Villa-Castillo (MSF 1994, PhD 2000) is the forest health manager for CONAFOR (Comisión Nacional Forestal), Mexico's equivalent to the U.S. Forest Service. In Mexico, Díaz-Calvo and Villa-Castillo were both gracious hosts and knowledgeable guides. Wagner and Hallett were treated to dinner at Díaz-Calvo's home one evening and lunch on the beach. The two alumni also collaborated with Wagner and Hallett to produce an article that has been submitted to the Journal of Forestry entitled, "Teak Plantations: Economic Bonanza or Environmental Disaster?"



Javier Díaz-Calvo, Jamie Villa-Castillo and Regents' Professor Mike Wagner (shown from left to right) in a 13 year old teak plantation.



This cutting board is one of many high quality products made with teak grown in Mexican plantations.

New Teen Summer Camp at the Centennial Forest

The Centennial Forest has been proud to offer environmental education programs to our community for nearly seven years, and this summer we are excited to introduce a brand new program for teens funded by the Environmental Protection Agency. This newest addition to our annual summer offerings focuses on challenging teens to solve one of societies' largest looming environmental issues: Global Climate Change. During their one week "on the case" at Climate Change Challenge (CCC) camp, kids will learn all about the causes of climate change and various environmental professionals that are currently working to tackle it. The goals of CCC are to introduce teens to career opportunities working for the environment and to empower our next generation of voting citizenry by giving them the tools to critically analyze environmental issues while also working toward solutions in a collaborative environment. We currently still have openings for teens in our CCC camp. Please check out the website below for registration information.

Since inception in 2004, the Junior Forester Academy, the Senior Forester Academy, and the Outdoor Leadership Academy have hosted nearly 500 campers and have given away over \$150,000 in scholarship aid. During fall of last year, we were thrilled to see our first camp alumni begin making their way into NAU to pursue careers in natural resource management. Among our proudest accomplishments is that we have not been forced to turn

any child away from our programs on the basis of financial need. We hope to continue meeting the needs of our community by providing scholarships to those families that cannot afford this experience for their children. In support of this effort, we are currently accepting sponsorships and donations from the community to keep our scholarship fund growing. As always, donations to our non-profit programs are tax deductible and a great way to support our next generation of environmental stewards!

To find out more about these programs go to our website www.nau.edu/CFcamps or contact Cheryl.Miller@nau.edu at 928-523-6727.



A group of campers developing their orienteering skills.



Student Services Coordinator Jennifer Tsonis (lower left) leading a group of senior campers in an environmental careers exploration game.

Carbon Storage (continued from page 1)

Southwestern ponderosa pine forests are slow to recover the capacity for carbon sequestration after intense fires because the dry, cool climate strongly limits tree regeneration. However, recovery is rapid following fuel-reduction thinning, which greatly stimulates growth of the remaining trees.

The effects of forest management and disturbances such as wildfire are an important part of the larger puzzle involving forests and climate change, but what about the carbon consequences of harvesting some trees to reduce potential fire intensity? This question was recently addressed by Assistant Professor Alex Finkral, Centennial Forest Manager JJ Smith, and several forestry students. The team led by Dr. Finkral examined virtually every aspect of the thinning operation conducted as part of Dr. Kolb's study, with the goal of determining the overall carbon balance of the operation. They considered the carbon released by the workers commuting to the site, by the harvesting machinery, and for transporting the logs. They also considered how much carbon would be released by burning the remaining slash and by the products eventually made from the harvested wood.

Dr. Finkral and his team's work showed that carbon emissions from the actual harvest are surprisingly small. From a carbon balance perspective, the method used to dispose of the slash and the products made out of the

wood are stronger determiners of when and how much carbon is released. A harvesting operation that results in short-term uses of wood (e.g., firewood) followed by burning the slash may produce a net release of carbon, while an operation that results in longer-lived products, such as lumber, may result in a significant amount of carbon storage. The study also highlighted a very important potential tradeoff—while there may be a net carbon release from a thinning operation, it is still much less than the potential release if no thinning is done and an intense fire occurs.

As a result of this work, a number of research papers have been published in scientific journals. We encourage you to contact Dr. Kolb (Tom.Kolb@nau.edu) or Dr. Finkral (Alex.Finkral@nau.edu) if you are interested in obtaining copies of their papers.

Ultimately, we hope their work will help make the case for an increased investment in forest management and restoration in the Southwest. It may help facilitate the participation of southwestern forests in global carbon markets, which could result in significant amounts of financial support for forest management. Increased financial support would be good for the forests and economy of the region, while also contributing to efforts to mitigate the effects of increasing concentrations of carbon in our atmosphere.

School of Forestry Advisory Council Formed

A 14-member Advisory Council, consisting of both alumni of the School of Forestry and other Forestry professionals, held its first meeting on October 23rd. The day-long meeting included a presentation on the status and possible future goals for the school, a discussion with Paul Jagodzinski, Dean of the College of Engineering, Forestry, and Natural Sciences, and work on a set of by-laws to guide future activities of the group. The Advisory Council members had lunch with a group of undergraduate and graduate students and also had an open session with faculty and staff.

Following this "stage-setting" first meeting, Advisory Council members have been providing feedback and advice to the school on a number of issues, including development of a plan to increase the national profile of the School of Forestry and to more clearly position it as one of the very best Forestry programs in the nation. More information on the council and its members can be found in the "About Us" section of the School of Forestry's website.



Fall 2009 meeting attendees from left to right. Back Row: Steve Templin (BSF 1978), John Stephenson (BSF 1963), Lee Alford (BSF 1969, MSF 1971). Second Row: Sam Foster, James Allen, Blair Moody (BSF 1975), Marsha Kearney, Macario Herrera, Ted Schaefer (BSF 1975). Front Row: April Sandoval, Molly Pitts, Deanne Shulman (BSF 1981), Mary Coulombe (BSF 1984). Not pictured: Dan Binkley (BSF 1977), Vicki Christensen and Zane Cornett (BSF 1976, MSF 1978).

Alumni Notes

Charlotte Minor, BSF 1981

Charlotte works on the Kaibab National Forest and reports that she is happily participating in reconstruction of forest campgrounds and other facilities and doing recreation planning for travel management, forest management plan revision, and other projects. She has also been volunteering at the NAU Research Greenhouse, helping to grow plants for fire restoration projects. She is married to Phil Patterson and has two children. Her family enjoys river running, hiking, and backpacking together. Charlotte is the daughter of the School of Forestry's founding dean, Charles O. Minor.

Julie Korb, PhD 2001

Julie is an Associate Professor in the Biology Department at Fort Lewis College in Colorado. She was honored with being named the Featured Scholar at Fort Lewis College for the 2009-2010 academic year. Since graduating, Julie has continued collaborating with NAU's Ecological Restoration Institute, conducting research related to forest restoration in mixed conifer forests in southwestern Colorado. Her other current research includes Sudden Aspen Decline effects on forest structure, soil and understory diversity, tamarisk impacts on plant community dynamics and hydrology along the Dolores River, invasive weed research in National Monuments, and ponderosa pine biomass harvesting impacts on soils. All of her research is conducted in the Four Corners region. She is married to David Kirk (NAU MS Geography 2001) and has a five year old son and three year old twins.

John Mathei, BSF 2005

John is the Assistant Fuels Management Officer on the Black Mesa Ranger District of the Apache-Sitgreaves National Forest. He started on the Apache-Sitgreaves as a seasonal employee and became permanent upon graduation. John was back on campus recently to help recruit students during the School of Forestry's Career Fair. He resides near Heber, AZ.

Luke Brandy, BSF 2006

Luke began his career with the Forest Service through the Student Career Experience Program in 2004 on the Plumas National Forest in Northern California. Through this internship, he received a buffet-style work experience in everything from hooting for spotted owls during population studies and assisting with burning projects for bunchgrasses used by Native American basket weavers, to laying out and administering timber sales and working as a "timber cop" ensuring contract compliance and resource protection during logging operations. Luke currently works as a Logging Systems Specialist analyzing the economic feasibility, social acceptability, and physical capabilities of different logging methods and equipment for timber sales and fuels reduction projects on the Rogue River-Siskiyou National Forest in Southwestern Oregon. He also strives to recruit as many NAU Foresters as possible to fill Forest Service jobs in his region. Luke is looking forward to a new job starting in the Spring of 2010 on the Arapaho-Roosevelt National Forest in Fort Collins, Colorado, implementing Integrated Resource Stewardship contracts for fuels reduction, ecosystem restoration, and bark beetle management.

Jacob Dyer, BSF 2006

After dipping his toes in research as an undergraduate in the School of Forestry, Jake went on for his MS in Forest Ecology at the University of Wisconsin-Madison (2009). While at Wisconsin, Jake completed research investigating the effects of single-tree and group selection harvests on productivity and regeneration of a second-growth, northern hardwood forest. Currently, he works as a research assistant for the Hardwood Silviculture Laboratory at Purdue University, Indiana, under the supervision of Dr. Michael Saunders. There, he is involved in many different projects, including American chestnut silvics, reconstruction of an old-growth oak forest, and a large-scale forest management experiment (Hardwood Ecosystem Experiment) in southern Indiana. Later this year, he will be heading up to the University of Minnesota to pursue his PhD in Silviculture and Forest Ecology. Jake will be studying the impacts of recent climate change and stand structural complexity on tree growth in sub-boreal forests in northern Minnesota. One day, Jake plans on teaching and conducting research in forest ecology and forest stand dynamics.

We would like to include your update in an upcoming issue! Please send any info that you want us to print as an alumni note to ForestryAlumniInfo@xdl.nau.edu or by regular mail c/o Jim Allen, Executive Director, at the address listed on the back page of this newsletter.



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Then and Now

Professor Robert Larson is retiring at the end of this academic year, after nearly 35 years of outstanding service to the School of Forestry and its students. Bob is planning an active retirement, which may include some volunteer work overseas. Hopefully he'll also spend a lot more time casting flies than he has been able to in recent years!



Forest Seasons is a newsletter for Northern Arizona University School of Forestry alumni and friends. We welcome your feedback on the newsletter and encourage you to stay in touch. Feel free to call us at: 928-523-3031

Or visit the following websites:

School of Forestry nau.edu/Forestry

Centennial Forest nau.edu/CentennialForest

Ecological Restoration Institute nau.edu/eri

