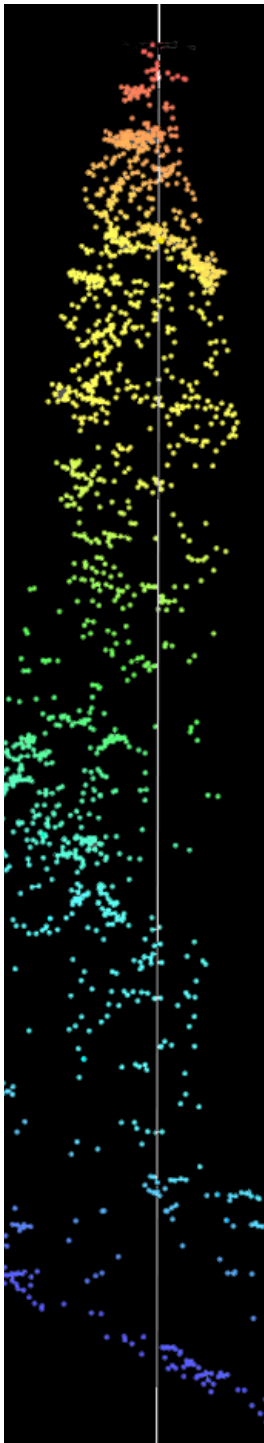




Tall Trees and Topography



LiDAR (Light Detection and Ranging), an airborne laser tool for measuring ground surface topography and forest structure, has been a boon to many types of forest and geomorphology studies (see Fall 2009 newsletter). At the Andrews Forest we are using this technology to examine the heights and spatial distributions of tall trees to get a sense of site productivity, geography of sites protected from top-pruning winds, and habitat structure. “LiDAR is like any new tool—you don’t know quite what it can do for you,” says Andrews Forest researcher Tom Spies. So first he and colleagues Mark Schulze, Matt Betts, Rob Pabst and Keith Olsen climbed trees to measure tree heights with a 100-meter tape. They also measured tree heights from the ground using laser surveying tools. They then compared the field measurements with the LiDAR depictions. The LiDAR measurements often come within a few centimeters of the heights that are measured with tapes and ground-based lasers. This gives them confidence in the LiDAR-based estimates of tree heights and enables them to conclude that several old Douglas-firs in the Andrews Forest exceed 90 meters (almost 300 feet) in height. The tallest trees tend to be found on lower topographic positions near streams. Such sites may be more productive and provide more protection against storms that can break-off the tops of these giant trees.

(Left) A LiDAR image of a tall tree at the Andrews Forest. Colored dots code 3-D locations of signal returns within this 90-meter tall Douglas-fir.

Wireless Connections

For years, Andrews Forest researchers have used radio telemetry to transfer climate and hydrological data from remote forest sites to the field station and the internet. Demands for high-speed data transmission have increased as sensor technologies advance and as researchers pioneer cutting-edge applications such as real-time isotope analyzers. Radio telemetry is no longer fast enough. The wireless cloud project is establishing a high-speed, high-throughput system that will eventually cover 90% the Andrews Forest. The foundation of this system is a two-step, high-speed WiFi link from headquarters to Roswell Mountain on the northwest bounding ridge of the Lookout Creek watershed. The Roswell Mountain site is located a half mile straight up from the nearest road on the third highest point on the Andrews; construction materials and supplies were carried up the mountain in backpacks and delivered by helicopter airlift. With luck and a warm fall, Roswell Mountain will be online before the year ends. A series of 900-megahertz radios will link research sites to this wireless backbone. Other applications include webcams to monitor snowpack and plant phenology and a roving outdoor virtual classroom. A second phase of the project could use the towers to provide a high-speed internet connection between the Andrews Forest and Oregon State University in Corvallis.



A helicopter delivers supplies for the construction of a WiFi tower at the top of Roswell Mountain at the Andrews Forest. The tower will be part of a wireless connection across much of the Andrews Forest site. Photo by Jay Sexton.



HJ ANDREWS EXPERIMENTAL FOREST

The Andrews Forest Newsletter Issue 11 Fall 2011

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The H.J. Andrews Experimental Forest Where Ecosystems Are Revealed

The H.J. Andrews Experimental Forest is the hub of a cooperative program of research, education, and research-management partnership involving Oregon State University and the USDA Forest Service's Pacific Northwest Research Station and Willamette National Forest. The mission of this partnership is to support basic and applied research concerning forests, streams, and watersheds, and to foster strong collaboration among ecosystem science, education, natural resource management, and the humanities.



Letter from the Leadership

It is with mixed feelings that I write this newsletter message to you—my last as Andrews Forest LTER Principle Investigator (Lead PI). As scheduled, I'm retiring from that role after six years at the helm. The Andrews Forest LTER program has a practice of changing Lead PI every six years, around the time of our midterm review, which allows the new Lead PI time to organize the team to write the next LTER proposal to the National Science Foundation. Showing his strong support for the Andrews Forest LTER program, Dean Hal Salwasser of the OSU College of Forestry has dedicated the Ruth H. Spaniol Chair of Natural Resources for the next six-year term of the Lead PI, and there is currently a search underway to identify a top-notch scientist for this role. We have a terrific leadership team in place to help the new PI get his/her feet on the ground, so I know our program will continue to thrive.



I am very pleased with two areas of special emphasis I've had for these six years. First, to push our science to connect global change research with our traditional strengths in forest ecology, watershed science, and ecosystem dynamics. We are doing a good job of this through work on the influence of complex topography on microclimate, revealing the importance of transient events of cold air pooling and drainage. I am expecting exciting new insights will emerge from this work in the coming years, with important local and global implications. I have also worked hard to strengthen the program's visibility and relations within the university, and we've made important progress. An important feature has been to enlist new faculty and student participants in the program. It is a pleasure to see new, young faculty coming on to join with the stalwarts to carry the program forward. I am confident that our wealth of historic information and current understanding of forests, rivers, and watersheds will be important for science and society in the coming years.

—Barbara Bond, Lead Principal Investigator of the Andrews Forest LTER, Ruth H. Spaniol Chair, Department of Forest Ecosystems and Society, Oregon State University (photo by Cheryl Hatch/OSU).

Student Spotlight—Monica Hubbard



Monica Hubbard, Andrews Forest LTER Graduate Student Representative. Photo by Lina DiGregorio.

How much do Oregonians know about water? Where and how do they think it should be used? These are just a couple questions Environmental Sciences PhD candidate Monica Hubbard is attempting to answer with her current research. While human dimen-

sions research such as this may not on the surface appear to apply to research at the Andrews Forest, it, as well as other ongoing research, may soon influence where Oregon sees its water being used. The Oregon Water Resources Department is in the process of developing a statewide Integrated Water Resources Strategy (IWRS) which will influence, if not determine, where Oregon's surface and groundwater are diverted, and how they're used. One aspect of the long-term planning process includes the results from Monica's research. In addition, Monica also instructs a senior level research methods course, advises Political Science students, as well as serves as the LTER Graduate Student Representative for the Andrews Forest LTER program.

On the Map!

An updated map of the HJ Andrews Experimental Forest and LTER site is now available online at <http://andrewsforest.oregonstate.edu/lter/about/site/map.cfm?topnav=219>. Hard copies can be obtained at the Forest Science Lab in Corvallis, the Andrews Forest Headquarters, or the McKenzie River Ranger Station. The new map features updated roads and study sites, information on the Andrews Forest program, insets for public trails, and a self-guided walking tour of the headquarters area (right).



Faculty Faces—Christoph Thomas

Christoph Thomas, Assistant Professor in OSU's College of Oceanic and Atmospheric Sciences, has been on campus since 2005, beginning as a post-doc in the College of Forestry before joining the faculty to further his studies of terrestrial-atmosphere interactions. His work at the interface between global change science and micrometeorology in mountain landscapes is critically important in the ecological sciences world and also to the forest land management community trying to come to grips with climate change. Chris grapples with questions such as "How does local topography interact with air drainage and pooling and will climate change modulate these connections?" which is central to Andrews Forest LTER studies. The National Science Foundation recognized his past and prospective future successes with a prestigious "early career" award. The Andrews Forest program is proud



Chris Thomas installing a sonic anemometer that measures high-resolution wind speed and temperature to quantify air-vegetation interaction. Photo by bMM group, <http://oregonstate.edu/bmm/>

and pleased that Chris will expand his roles in the instrumentation-intensive Watershed 1 studies of soil-plant-atmosphere exchanges of carbon and water.

Link with Willamette National Forest—Leadership Change in the McKenzie Ranger District

Leadership of the McKenzie River Ranger District, home of the Andrews Forest, underwent transition during summer 2011. We thank Mary Allison for her seven years of leadership at the District and welcome Terry Baker as the new District Ranger. Baker brings experience in the fields of forestry, botany, wildlife, recreation, fire, range, and public and legislative affairs in the Eastern and Western US. Most recently he was District Ranger on the Nebraska National Forest and Grassland, and earlier he was a forester for the Rogue-Siskiyou National Forest, where he co-managed a large fuels treatment program. He holds BS degrees in agriculture (Florida A & M Univ.) and forestry (Univ. of Florida) and a MS in Forest Management and Policy (Yale). Despite being welcomed to the District by a busy fire season, Baker says, "This is a gorgeous area where I can express my keen interest in incorporating science and people into the management of the national forests."



Terry Baker, new District Ranger, McKenzie River RD. Photo USFS.

Network Science, New Findings

Several Andrews Forest veterans recently published the paper "Productivity Is a Poor Predictor of Plant Species Richness" in the journal *Science*, based on analysis from 48 meadow and grassland sites in five continents, including Lookout and Bunchgrass meadows in and near the Andrews Forest. Lead authors Peter Adler (Utah State Univ. and REU student at Andrews in 1993) and Elizabeth Borer and Eric Seabloom (U. Minnesota, formerly at OSU, see Issue 3 of the Newsletter) led a large team which found that the widely-cited theory that the number of species rises then declines with increasing productivity is not substantiated by field observations. This is a product of NutNet, a NSF-supported network based at the University of Minnesota, that employs common observation and experimentation protocols to address a variety of ecosystem questions concerning the interplay of biodiversity and productivity. The long-term studies continue, and we look forward to further provocative findings.



Elizabeth Borer and Eric Seabloom (center) at Lookout meadow at the Andrews Forest in 2009. Photo by Lydia O'Halloran, co-author and post doc on the team.

Long-Term Ecological Reflections

Our nine-year-old Long-Term Ecological Reflections program advances on several fronts. Locally the flow of visiting writers continues unabated with new residents in fall and spring. More recent residents are using increasingly diverse genres, such as blogging and mixed media postings. Karin Gastreich, ecology professor at Avila University (Kansas City, MO), blogger, and fantasy fiction writer, writes of her first morning in the forest, “the forest has a way of speaking to you in your dreams, and by the time the sun illuminated the misty woods with a gray morning light, my head was turning with ideas and images.”

(<http://andrewsforest.oregonstate.edu/lter/research/related/writers/wir/gastreich1.pdf>)

As reported in the last newsletter, we continue to push more sites to undertake Reflections-like programs. More than a dozen sites have posted profiles of their programs on a centralized webpage (<http://www.ecologicalreflections.com/>) and more are initiating programs.

Research Experiences for Undergraduates

The Andrews Forest hosted multiple programs for undergraduate education over the summer. Two Research Experience for Undergraduate (REU) students were funded by the Andrews Forest LTER grant. Nine REU students studied pollination biology funded by an NSF site REU grant led by OSU’s Sujaya Rao and Andy Moldenke. The Eco-Informatics Summer Institute, also NSF-funded, enabled 15 students to work with multiple researchers at the Andrews Forest and Oregon State University, led by Desiree Tullos and Julia Jones. Andrews Forest REU students have provided valuable contributions to various projects while learning about world-class research in our coniferous forest biome. Most go on to graduate school, and we frequently encounter them as graduate students at OSU, at universities associated with other LTER sites, or working with advisors whom they met through some connection established during their REU experience. Many of our former REUs have gone on to become outstanding educators, researchers and administrators (see *Network Science* article, Page 3).



Undergraduate Nick Curcio (right), studied silica in soils at the Andrews Forest. Photo by Julie Pett-Ridge

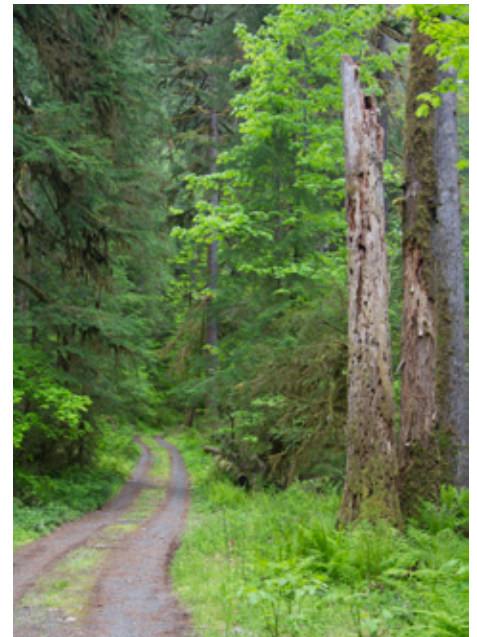
O’Connell Receives Forestry Education Award

Kari O’Connell, Project Coordinator for the Oregon Natural Resources Education Program, was selected as a



Kari O’Connell. Photo by Lina DiGregorio

recipient of the 2011 Mary Rellergert Forestry Education Award in recognition of “her work in building teachers understanding and knowledge about Oregon’s forests; her ability to engage researchers with teachers in transferring field research into relevant field-based inquiry projects for students; her commitment to sustaining the application of learning through the creation of communities of practice; and her enthusiasm, energy, and passion for her work.” Kari manages the Research Experience for Teachers and the Schoolyard LTER programs at the Andrews Forest and has been instrumental in the recognized successes of those programs. Congratulations, Kari!



An access road to a research watershed and climate station at the Andrews Forest. Photo by Lina DiGregorio.

Support for the Andrews Forest

The Andrews Forest Program is dedicated to research and education about forests, streams, watersheds, and our engagement with the land.

The Andrews Forest Fund enables individuals and organizations to support the important work at the Andrews Forest.

Our greatest need at this time is funds for our GREEN House residence building at the Andrews Forest Headquarters. The building will house the Forest Director and function as a center for scholarship by visiting scientists, writers, and artists. A grant from the National Science Foundation provides for building and construction; additional funds are needed to appropriately outfit the building. The name “GREEN House” (Green Research and Education for Ecological Networks) recognizes the use of green technology in its construction and operation.

To make a gift, please contact the OSU Foundation (800-354-7281) or <http://andrewsforest.oregonstate.edu> and click on Donate.