

# Andrews Forest NEWSLETTER



Issue 4

Spring 2008

## Microbial Observatory

A Microbial Observatory (HJA-MO) was established at the Andrews Forest in 1999 with support from the National Science Foundation (NSF). The initial focus of the HJA-MO was to explore the microbial ecology of soils under different vegetation types at high-elevation meadow and forest sites. During its first five years, more than a half-dozen OSU graduate students, working under the direction of Peter Bottomley (Microbiology), Kermit Cromack Jr. (Forest Science), and David Myrold (Crop and Soil Science), measured the composition of bacterial and fungal communities at these sites, with particular emphasis on linking the structure and function of bacteria involved in nitrogen cycling. A novel aspect of the research was to study how quickly microbial communities and activities respond to changes in environment. This was accomplished by reciprocally transferring soil cores between meadow and forest sites.

A general observation was that microbial activities, such as nitrification and denitrification, responded more quickly to this change than did the composition of their bacterial communities. A second phase of research at the HJA-MO began in 2004 with renewed funding by NSF. At that time, Joey Spatafora (Botany and Plant Pathology), Bruce Caldwell (Forest Science), and several new graduate students joined the research team. The microbial communities associated with ectomycorrhizal mats are the emphasis of the current research phase. An initial discovery found more diversity among mat-forming fungi than was anticipated. The team adapted the reciprocal soil-coring method to explore



OSU scientists Peter Bottomley (left) and David Myrold (right) examine soil microbial activity in the Andrews Forest. Photo by Lynn Ketchum, OSU EESC.

the “birth and death”—or establishment and decomposition—of ectomycorrhizal mats, which can occupy up to 50 percent of the surface area of soils in the Andrews Forest. The HJA-MO was featured in a story titled, “The World Beneath Our Feet” in *Oregon’s Agricultural Progress* ([oregonprogress.oregonstate.edu/sum05](http://oregonprogress.oregonstate.edu/sum05)).

## HJA Day: June 18, 2008

HJA Day, the annual field gathering at the Andrews Forest, includes field trips to sites in the forest, presentations from researchers and managers and a barbecue dinner. Everyone is welcome to attend. The event is free and transportation is provided from the OSU campus. Register by June 13 on the *What’s New* page of the Andrews Forest Web site, <http://andrewsforest.oregonstate.edu>.



Andrews Forest scientist, Stan Gregory, speaking at HJA Day 2007. Photo by Lina DiGregorio

## Andrews Forest 60<sup>th</sup> Anniversary

This is a year to celebrate anniversaries—the Andrews Forest has been an experimental forest for 60 years and the Forest Service’s system of 80 Experimental Forests and Ranges celebrates the centennial of the establishment of its first properties and experiments. Much has changed over the decades! The program at the Andrews Forest continues to evolve rapidly as new investigators and new studies build on the foundation of multi-decade experiments. For example, the small watershed studies are 55 years old, and Mark Harmon’s log decomposition study has completed 23 of its planned 200 years. Reflections on how the research forests have contributed to science and management are part of this effort. Positioning the system for the next century is another priority. From the Andrews Forest experience, we can see a future with new collaborations with social scientists, mathematicians and computer scientists, environmental philosophers, and creative writers. There is a strong push to pattern a set of the experimental forests on the LTER model of inter-site science and information sharing. The centennial of the Experimental Forests and Ranges will be celebrated at sites across the country including the Andrews Forest: stay tuned for details.



The Lookout Creek watershed was dedicated in 1948 as the Blue River Experimental Forest. At a 1953 ceremony pictured here, it was renamed in honor of H.J. Andrews, an influential Forest Service leader.



HJ ANDREWS EXPERIMENTAL FOREST

## The Andrews Forest Newsletter Issue 4 Spring 2008

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.

The **Andrews Forest Newsletter** is a semi-annual publication of the Andrews Forest Program.

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## Letter from the Leadership

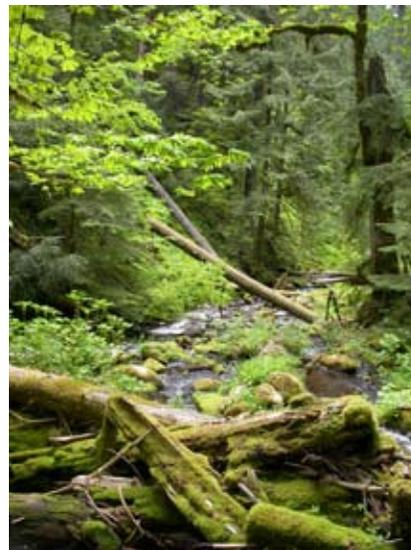
This winter's record snowfall (see "Heavy Snowfall at the Forest") provides a perfect backdrop for another milestone of 2008: in February, we submitted a proposal to the National Science Foundation for the sixth, six-year funding cycle for the Andrews Forest LTER program, or "LTER6." I smile as I note that climate change and climate variability are major themes of LTER6, and the photograph on page 4 was taken the day after we submitted this proposal. Interestingly, despite strong evidence from all over the world that the global climate is warming, data from the Andrews Forest show little indication of consistent trends over the last half-century. Are we headed for a sudden "tipping point" in the future? A goal of LTER6 is to project how various future climate scenarios would affect our forest and stream ecosystems. We are looking forward to several important programmatic changes during LTER6, including substantial improvements to cyberinfrastructure (connecting data, computers, and people to enable scientific inquiry), closer ties between education and research, and greater emphasis on the coupling between natural and human systems. We'll highlight these in future issues of the Newsletter. Until then, we hope that you'll enjoy the stories in the current issue.

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



## New Publication: LINX II Nitrate and Streams

Andrews Forest scientists Sherri Johnson, Linda Ashkenas, Stan Gregory, and Dan Sobota are among coauthors of a new publication in *Nature* entitled "Stream denitrification across biomes and its response to anthropogenic nitrate loading." This is a product of the Lotic Intersite Nitrogen Experiment (LINX II) which uses isotopically labeled nitrogen to identify the fate of nitrogen in stream ecosystems flowing



Mack Creek, which flows through old growth at the Andrews Forest. Since the early 1970s, Mack Creek has been the site of many stream and riparian studies, including LINX. Photo by Sherri Johnson.

through urban, agricultural, and "reference" lands. A key concern of these studies is that land use practices can greatly increase delivery of nitrogen to streams and rivers, with detrimental impacts on water supplies and ecosystems. Synthesizing results from 72 streams in eight regions of the country, the LINX science team found that processes operating in streams can substantially decrease nitrogen loads, but that reduction of the load diminishes with increasing nitrogen concentration. In "healthy" stream ecosystems with low nitrogen concentrations, such as the Andrews Forest, 40 to 60 percent of the labeled nitrogen is taken up within 500 meters of where it entered the stream. Results from the nine study streams in Oregon are being prepared for submission, and many other papers are underway from this continental-scale study.

## Personnel Changes

Several key positions associated with the Andrews Forest have changed hands. Kari O'Connell stepped down as Forest Director to stay closer to home and her son. We thank Kari for her excellent leadership of the Forest over the past four years. The LTER renewal proposal engaged new leaders and scientists. Tom Spies, who will replace Fred Swanson as one of the five signatories on the NSF grant, will bring valuable forest ecology and management experience to the Executive Committee. The LTER6 research program will bring increased participation of scientists such as Matthew Betts (biodiversity), Chris Daly (climate modeling), Denise Lach (social sciences), Anne Nolin (snow hydrology), Brent Steel (social sciences).

## Where Are They Now? Ted Dyrness



Ted Dyrness (above) in 1962, taking soil measurements in a laboratory on the Oregon State University campus, and now (below) in the PNW Forestry Sciences Laboratory.

As co-author of the biblical Franklin and Dyrness *Natural Vegetation of Oregon and Washington*, Ted Dyrness is a household name to those interested in forests of the Pacific Northwest. The book was first published in 1973 during Dyrness's 12 years as a Forest Service scientist at the Andrews Forest beginning in 1962. Dyrness led early studies of soils of the Andrews Forest, especially on the experimental watersheds, and also established and tracked vegetation plots in experimental watersheds beginning before clearcutting and burning. Those vegetation studies have become the longest-running record of vegetation development after clearcutting in the region and have yielded numerous important publications. Dyrness also helped with development of nutrient cycling research during early stages of the 1970s International Biological Programme.

In 1974, Dyrness moved to Fairbanks, Alaska, where he was Program Leader of the Forest Service's Institute of Northern Forestry. He teamed up with University of Alaska colleagues to score a series of National Science Foundation grants, culminating in the Bonanza Creek Long-Term Ecological Research project. A central theme of his work was soil and vegetation development along a chronosequence of floodplains and terraces on the Tanana River.

Dyrness retired in 1990 but became active in the Andrews Forest program again by helping to bring early soil descriptions and long-term vegetation data into a form suitable for posting on the webpage. He also assisted Max Geier in production of his recent book on the history of the community of scientists and land managers working at the forest over its 60-year history. So, in many ways, Ted Dyrness remains a vital source of ideas and information about forests of the Pacific Northwest.

## Student Spotlight: David Diaz

David Diaz watches soil breathe. By analyzing isotopes and flux rates of soil-respired carbon dioxide, Diaz is evaluating the turnover of soil carbon. His research utilizes the Detrital Input and Removal Treatment (DIRT) plots at the Andrews Forest (see the Fall 2007 issue of the Newsletter). Diaz has found that decomposition of soil organic matter is enhanced when simple sugar is added. The presence of roots may be related to this effect, his findings suggest. Diaz works with OSU professors Kate Lajtha and David Myrold and expects to complete his Masters Degree in Spring 2008 in the Department of Crop and Soil Science at OSU.

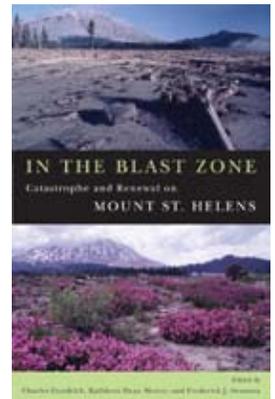


David Diaz collects soil-respired carbon dioxide for isotope analysis using a LI-COR gas analyzer in one of the DIRT plots at the Andrews Forest. Photo by Lina DiGregorio.

## Reflections

The Long-Term Ecological Reflections Program has made some important steps recently. This spring, four new writers in residence will bring the total number of residencies to 18 (see the growing body of work by past writers posted at [www.fsl.orst.edu/lter/research/related/writers.cfm](http://www.fsl.orst.edu/lter/research/related/writers.cfm)).

A Reflections Program book of poems and essays by creative writers and scientists who shared experiences at Mount St. Helens in 2005 is just off the Oregon State University Press—"In the Blast Zone: Catastrophe and Renewal at Mount St. Helens." We have been so heartened by the interesting developments in Reflections Program that we have gone to other sites to encourage similar programs at places such as Bonanza Creek Experimental Forest and LTER site (Alaska), Sagehen Experimental Forest (eastern Sierras of California), and the Warra LTER site (Hobart, Tasmania).



## Prescribed Fire in Native Forests



Prescribed light-severity fire in a recently thinned stand in the Blue River watershed. Photo by the USDA Forest Service.

The research-management partnership associated with Andrews Forest is exploring use of historical fire regimes as a general template for future vegetation management. This history-based approach may have advantages over the Northwest Forest Plan approach, particularly for species associated with late-successional forests. The Blue River Landscape Strategy (BRLS), developed by an interdisciplinary team of McKenzie River Ranger District employees and Andrews Forest scientists, was designed to explore this idea. Implementation of various aspects of the Strategy has been underway since the late 1990s, using an adaptive management process to assess new information, including results of monitoring, to plan further action. The team recently completed a two-year review of the plan and determined that a key issue was to emulate historic, moderate-severity fire in 40- to 120-year-old stands. The team prescribed fire and silvicultural techniques suitable for these objectives. These low- to moderate-severity fires generally clear the understory and kill a small fraction of overstory trees. General silvicultural prescriptions were developed by the team to represent these historic conditions. Details on the BRLS can be found at [www.reo.gov/ecoshare/ccamp/index.shtml](http://www.reo.gov/ecoshare/ccamp/index.shtml).

## Undergraduate Research Experience

The NSF-sponsored Research Experience for Undergraduates (REU) program provides students the opportunity to engage in active research. In 2007, the Andrews Forest Program hosted multiple REU students including Farm Saechao and Julia Pedersen.

Saechao, a senior at OSU's College of Health and Human Sciences, did an REU project on effects of climate change on rural communities. She worked under the supervision of Brent Steel, Professor in OSU's Department of Political Science. Saechao helped to identify indicators used to assess a community's ability to adapt to changes such as natural disasters. She visited rural communities in Oregon and spoke with city managers about current conditions of their cities and plans for changes. Says Saechao, "After working on this project, I feel like graduate school is more of a possibility."

Julia Pedersen, a senior at OSU in Crop and Soil Science, did an REU project on how mycorrhizal mats contribute to forest soil carbon dioxide production. She worked under

the supervision of OSU Forest Science Ph.D. student Claire Phillips and Forest Science Professor Barbara Bond. Reports Pedersen, "carrying this experiment to completion was helpful to me as an undergraduate interested in pursuing a career in soil science. I was able



REU Student Julia Pedersen (left) and OSU student Priscilla Woolverton take soil samples at the Andrews Forest. Photo by Claire Phillips.

to experience a portion of what it is like to be a graduate student."

REU positions will be available at the Andrews Forest this summer. Interested students should look at the Opportunities pages of the Andrews Forest Web site.

## Heavy Snowfall at the Forest

The winter of 2007–2008 brought record snowfall to the Andrews Forest. Snow depth reached 14 feet at 4,300-foot elevation in February 2008. Al Levno, who worked at the Andrews Forest with the Forest Service between 1963 and 1998 and now serves as a volunteer, went to high-elevation sites as part of a weekly Andrews Forest watershed check in early February. Levno reported: "A lot of snow had fallen during the previous week, and I was looking forward to a trip through



The Andrews Forest Mack Creek Gaging Station with a generous helping of fresh snow, February 2, 2008. Photo by Al Levno.

new snow in the old-growth forest one more time. Little did I know that the snow depth would be greater than I had seen in 30 years. Above 2,500-foot elevation, the snow depth neared 8 to 10 feet and travel in the big Tucker Snocat through the soft, wet snow slowed to a half mile per hour. We entered a winter wonderland within the wonderland of the forest. White snow weighted down green branches on brownish tree trunks against a backdrop of snowflakes falling in a grey sky. It

was just unbelievably beautiful. Not since the late '60s had I seen snow this deep at the Andrews Forest." Fred Bierlmaier, who has worked at the site for 30 years, noted that headquarters (1,436-foot elevation) had more snow than anyone remembers seeing there. Piles of snow went higher than building roofs and site staff ran out of places to put the plowed snow. To read more about Levno's trip and to view his photographs, go to [www.allevnophotos.com](http://www.allevnophotos.com).



Understory vegetation at the Andrews Forest. Photo by Lina DiGregorio

## The Andrews Forest: Where Ecosystems Are Revealed

The Andrews Forest Program is dedicated to long-term study of complex forest and stream ecosystems of the Pacific Northwest, development of innovative and collaborative approaches to management of forests and watersheds, and communication of findings to land managers, researchers, policymakers, teachers, students, and the public.

## Support the Andrews Forest

By making a contribution to the Andrews Forest Fund, individuals and organizations support research, outreach and education, and ecological monitoring. To make a gift, please contact the OSU Foundation (800-354-7281) or go to our online giving page at [www.fs1.orst.edu/lter/about/forestfund.cfm?topnav=171](http://www.fs1.orst.edu/lter/about/forestfund.cfm?topnav=171).

Your gift to support the Andrews Forest is an investment in the long-term viability of our forests and streams.